(Tenth) Annual Report

OF THE

HYDRO-ELECTRIC POWER COMMISSION

OF THE

PROVINCE OF ONTARIO

FOR THE YEAR ENDED OCTOBER 31st

1917

VOLUME I.

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1918

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To His Honour, COLONEL SIR JOHN HENDRIE, K.C.M.G., C.V.O.,

Lieutenant-Governor of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned has the honour to present to Your Honour the Tenth Annual Report of the Hydro-Electric Power Commission of Ontario for the fiscal year ending October 31st, 1917.

Respectfully submitted,

ADAM BECK,

Chairman.

TORONTO, ONT., February 12th, 1918.

COLONEL SIR ADAM BECK, K.B., LL.D.,
Chairman, Hydro-Electric Power Commission of Ontario,
Toronto, Ont.

SIR,—I have the honour to transmit herewith the Tenth Annual Report of the Hydro-Electric Power Commission of Ontario for the fiscal year ending October 31st, 1917.

I have the honour to be,

Sir,

Your obedient servant,

W. W. POPE,
Secretary.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

COLONEL SIR ADAM BECK, K.B., LL.D.

HONOURABLE I. B. LUCAS, M.P.P.

COLONEL W. K. McNAUGHT, C.M.G.

W. W. POPE, Secretary.

F. A. GABY, Chief Engineer.

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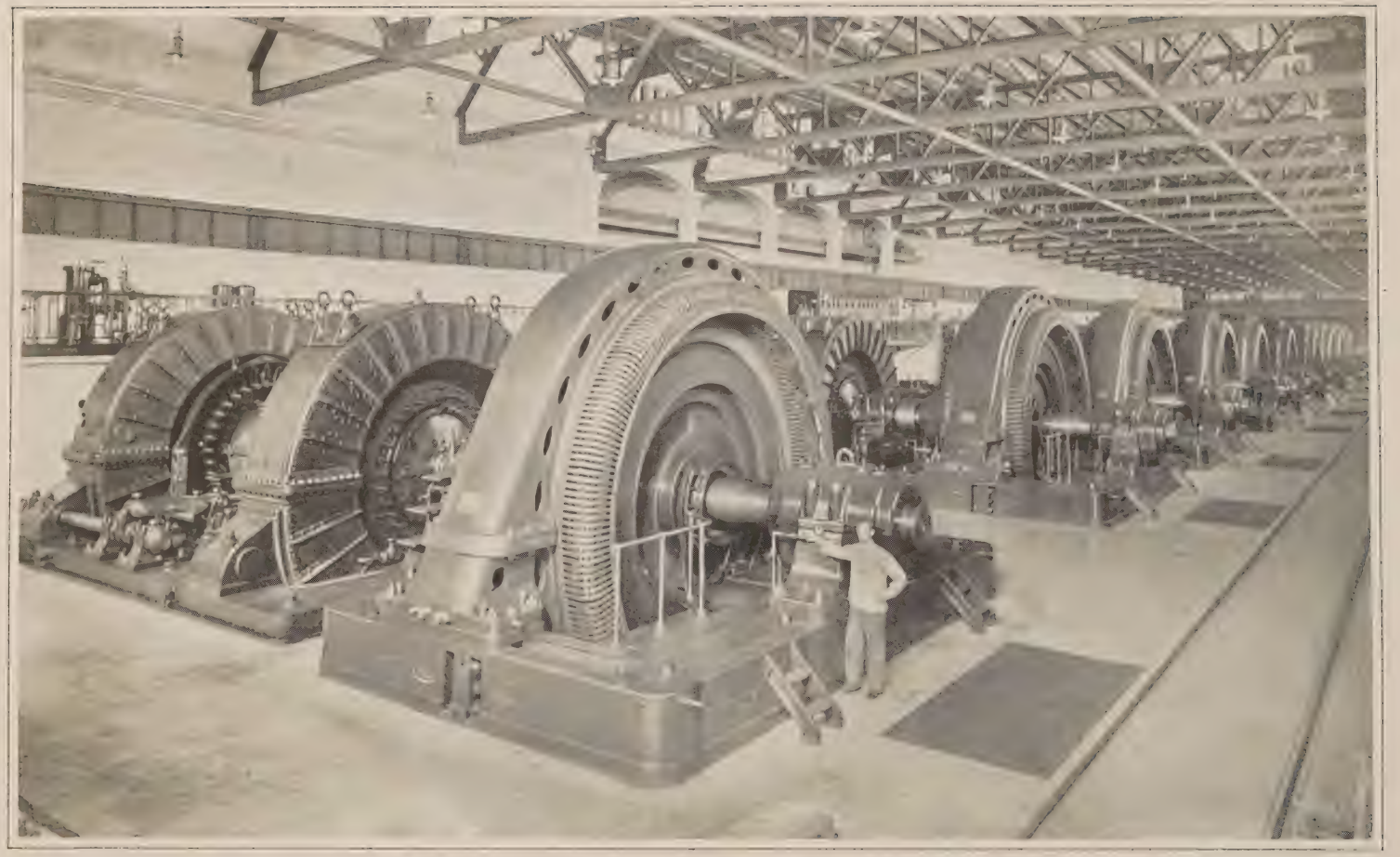

An Interior View of the Ontario Power Company's Generating Station

TENTH ANNUAL REPORT

OF THE

Hydro-Electric Power Commission of Ontario

SECTION I

LEGAL PROCEEDINGS

ACTS

The following Act to amend *The Power Commission Act* and to confirm certain by-laws and contracts was passed by the Legislature of the Province of Ontario during the Session of 1917.

An Act to amend *The Power Commission Act* and to confirm Certain By-laws and Contracts.

Assented to 12th April, 1917.

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. This Act may be cited as *The Power Commission Act, 1917.* Short title.

2. Section 6*a* of *The Power Commission Act* as enacted by section 4 of *The Power Commission Act, 1916,* is amended as follows:— Rev. Stat. c. 39, s. 6a (6 Geo. V, c. 19, s. 4) amended.

(*a*) Subsection 1.—By adding at the commencement thereof the words "The Commission, with the approval of." Appointment of comptroller.

(*b*) Subsection 2.—By striking out the word "shall" in the first line and substituting therefor the word "may" and by adding after the word "proper" in the second line the words "and as the Commission may approve," and by striking out the words "Lieutenant-Governor in Council" in the sixth, eleventh and twelfth lines and substituting therefor the word "Commission." Books and accounts.

(*c*) Subsection 5.—By striking out the words "Lieutenant-Governor in Council" in the second line and substituting therefor the words "the Commission with the approval of the Lieutenant-Governor in Council." Vacancy in office.

(*d*) Subsection 7.—By inserting after the word "by" in the second line the words "the Commission, with the approval of." Salary.

Rev. Stat. c. 39, s. 8, amended.

3. Section 8 of *The Power Commission Act* is amended by adding thereto the following clauses:—

Acquiring stock in development companies.

(*g*) Acquire by purchase or otherwise on any terms and hold shares in any incorporated company carrying on the business of developing, supplying or transmitting electrical power or energy; and in connection with any such acquisition enter into any covenant or covenants, agreement or agreements, and pay for any such shares either in cash or bonds, debentures or other securities of the Commission, and guarantee, or covenant or agree for or in respect of the payment or performance of any bonds, debentures, securities, contracts or obligations of any company shares in which are so acquired, or of any company shares in which are held by any company in which shares are so acquired.

Issue of bonds, etc., to pay for shares.

(*h*) Issue bonds, debentures or other securities of the Commission for any of the purposes set out in clauses *a* to *g* in such form and containing such terms and at such rate of interest and payable in such manner and at such time or times as the Lieutenant-Governor in Council may determine.

Rev. Stat. c. 39, amended.

4. *The Power Commission Act* is amended by adding thereto the following section:—

Lands of Commission to be taxable.

Rev. Stat. c. 195.

12*a*.—(1) Notwithstanding anything in *The Assessment Act* contained, land owned by and vested in the Commission shall be subject to assessment and taxation for municipal and school purposes at the actual value thereof according to the average value of the land in the locality.

Buildings, works, etc., to continue to be exempt.

(2) Subsection 1 shall not apply to or include buildings, machinery, works, structures, substructures, superstructures, rails, ties, poles and other property, works or improvements owned, used or controlled by the Commission, nor an easement or the right of use or occupation or other interest in land not owned by the Commission, but all such buildings, machinery, works, structures, substructures, superstructures, rails, ties, poles and other property, works or improvements owned, used or controlled by the Commission, and every such easement or right, shall continue to be exempt from assessment and taxation as heretofore.

Rev. Stat. c. 39, amended.

5. *The Power Commission Act* is amended by adding thereto the following sections:—

Guaranteeing bonds of Commission.

14.—(*c*) The Lieutenant-Governor in Council is hereby authorized, on such terms as may be approved by Order-in-Council, to agree to guarantee the payment of the principal and interest of any bonds, debentures and other securities issued by the

Commission, and the form and manner of any such guarantee or guarantees shall be such as the Lieutenant-Governor in Council may approve. The said guarantee or guarantees shall be signed by the Provincial Treasurer or such other officer or officers as may be designated by the Lieutenant-Governor in Council, and upon being so signed, the Province of Ontario shall become liable for the payment of the principal and interest of the bonds, debentures and securities guaranteed according to the tenor thereof, and the Lieutenant-Governor in Council is hereby authorized to make arrangements for supplying the money necessary to fulfil the requirements of the said guarantee or guarantees, and to advance the amount necessary for that purpose out of the public funds of the Province, and in the hands of any holder of or of any of such bonds, debentures or securities any guarantee so signed shall be conclusive evidence that the terms of this section have been complied with.

Guaranteeing performance of contract for purchase of shares.

14.—(*d*) The Lieutenant-Governor in Council is hereby further authorized on behalf of the Province of Ontario to enter into any covenants or agreements in connection with the acquisition by the Commission of any shares in any incorporated company and to guaranteee the observance and performance by the Commission of any contract or agreement of the Commission in relation to such acquisition.

Rev. Stat. c. 39, s. 18, amended.

6. Subsection 8 of section 18 of *The Power Commission Act,* as enacted by section 9 of *The Power Commission Act, 1916,* is repealed, and the following substituted therefor:—

Debentures of municipality not to be included in calculating limit of indebtedness.

(8) Notwithstanding anything in *The Municipal Act* or any general or special Act contained, debentures issued, or purporting to be issued by a municipal corporation which has entered into a contract with the Commission for a supply of electrical power or energy from the Commission for the purpose of carrying out such contract, or for constructing or equipping works for the development, transmission and distribution of electrical power or energy so supplied, shall not be included in ascertaining the limits of the borrowing powers of the corporation as prescribed by *The Municipal Act,* or such other general or special Act.

Rev. Stat. c. 19, s. 2.

Rev. Stat. c. 39, s. 19, amended.

7.—(1) Section 19 of *The Power Commission Act* is amended by adding thereto the following subsection:—

Extension, etc., of works in police village.

(4) Where the trustees of a police village have entered into a contract with the Commission for the supply of electrical power or energy and have heretofore constructed, purchased or acquired or hereafter construct, purchase or acquire works for distributing electrical power or energy, and the trustees of

the police village desire to extend or improve such works, they may apply to the council of the township for the passing of a by-law for the issue of debentures for such extension or improvement, and the council may pass the necessary by-law for borrowing such further sums as may be necessary for such extension or improvement and for levying by an annual special rate upon the rateable property in the police village, the sums required for the payment of the debentures issued for the extension or improvements.

Assent of electors not required.

(*a*) The by-law shall be approved by the Commission before the final passing thereof, but shall not require the assent of the electors.

Approval of Commission.

(*b*) Such approval may be given if it is shown to the satisfaction of the Commission that the extension is necessary or desirable and if sufficient additional revenue will be derived therefrom to meet the annual payments in respect of the debt and the interest thereon.

5 Geo. V, c. 34, s. 39, repealed.

(2) Section 518*a* of *The Municipal Act* as enacted by section 39 of *The Municipal Amendment Act, 1915,* is repealed.

Rev. Stat. c. 39, amended.

8. *The Power Commission Act* is amended by adding thereto the following section:—

Township distribution works.

19*a*.—(1) Notwithstanding anything in *The Public Utilities Act* or any other Act contained, the council of a township may pass by-laws:—

Lands and works.

(*a*) for acquiring lands and real and personal property, and erecting, constructing and operating works for the development, transmission and distribution of electrical power or energy in the municipality;

Contract with Commission.

General powers.

(*b*) for entering into a contract with the Commission with the assent of the municipal electors of the township qualified to vote on money by-laws, for the supply of electrical power or energy for the use of the municipality and the inhabitants thereof;

Rev. Stat. cc. 192, 193, 204.

(*c*) for exercising for the said purposes, any of the powers which may be exercised by the municipal council of a town under the authority of *The Municipal Act, The Local Improvement Act, The Public Utilities Act or* this Act.

Sectional township by-laws.

(2) The council of a township may by by-law set apart a portion of the township as to which any of the by-laws passed under subsection 1 may have effect, and may submit the by-law for

the establishment of such works, or for entering into such contract, to the municipal electors qualified to vote on money by-laws in the part of the township so set apart.

Debentures.

(3) Where the council has passed a by-law under subsection 2, the council may issue debentures for the purposes set out in subsection 1, and levy the special rate for the amounts required to be raised on account of sinking fund and interest for the payment of the said debentures, in the district so set apart.

Commission for control and management.

Rev. Stat. c. 204.

(4) The council may appoint a commission for the purpose of the construction of the works and the control and management of the same for the district so set apart in the manner provided by section 34 of *The Public Utilities Act*, but the commissioners appointed shall be residents of such district and it shall not be necessary to obtain the assent of the electors to the establishment of the Commission.

Rev. Stat. c. 39, amended.

9. *The Power Commission Act* is amended by adding thereto the following section:—

Debentures for extension or improvement not to be issued without approval of Commission.

24*a*.—(1) A municipal corporation which has entered into a contract with the Commission for the supply of electrical power or energy shall not pass any by-law for the issue of debentures for any extension or improvement to an electrical light, heat or power system without having first obtained the assent of the Commission to the amount of such issue and the purposes to which the same is to be applied.

Liability of members of council.

(2) Every member of the council of the municipal corporation passing a by-law in contravention of subsection 1 shall be personally responsible for any loss or expense occasioned to the corporation by such action unless he shows that he voted against the passing of such by-law or did everything in his power to prevent the passing of the same.

By-law to be void.

(3) Every by-law passed in contravention of subsection 1 shall be illegal and void and the Commission may take the same proceedings for quashing such by-law or restraining the corporation from issuing debentures thereunder as might be taken by a ratepayer of the municipality.

Section to have effect notwithstanding other enactments.

(4) This section shall have effect, notwithstanding the provisions of any other general or special Act heretofore enacted relating to any municipal corporation.

Rev. Stat. c. 39, s. 39, amended.

10. Section 39 of *The Power Commission Act* is amended by inserting therein, after the clause lettered (*a*), the following:—

Application of surplus funds in erection of office buildings.

(*aa*) In purchasing or otherwise acquiring a site and erecting thereon buildings for the occupation and use of the municipal commission as offices and for other business purposes, subject to the approval by the Commission of the site and cost and of the plans of any such building.

Erecting larger building than required and leasing part for other utilities.

(i) Subject to such approval, any such office building may be larger than is required for the immediate use of the Municipal commission and any part of such building not immediately required for the use of the municipal commission may be leased by it to the corporation or to any other municipal commission for the purposes of any public utility in the municipality.

5 Geo. V, c. 19, s. 14, ss. 3, amended.

11. Subsection 3 of section 14 of *The Power Commission Act, 1915,* is amended by adding at the end thereof the following words, "and the Commission may take the same proceedings in respect thereto as might be taken by a ratepayer of such municipality."

6 Geo. V, c. 19, s. 10, ss. 5, amended.

12. Subsection 5 of section 10 of *The Power Commission Act, 1916,* is amended by striking out the figure "7" in the last line thereof and substituting therefor the figure "9."

6 Geo. V, c. 19, s. 12, repealed.

13. Section 12 of *The Power Commission Act, 1916,* is repealed and the following substituted therefor:—

Collection of moneys from municipalities on sinking fund account.

12. Notwithstanding anything in *The Power Commission Act* contained, a municipal corporation which has entered into or shall hereafter enter into a contract with the Commission for a supply of power may be relieved by the Commission from payment of any sum on account of the sinking fund account for the first five years, during which payments are made to the Commission by the corporation under such contract, and the amounts required from such corporation on sinking fund account shall be payable during the then next ensuing thirty years.

Municipal corporations added as parties to contract of 1909.

14. The Municipal Corporation of the City of Sarnia, the Municipal Corporation of the Town of Dunnville, the Municipal Corporation of the Town of Forest, the Municipal Corporation of the Village of Point Edward, the Municipal Corporation of the Village of Rodney, the Municipal Corporation of the Village of Watford, the Municipal Corporation of the Village of West Lorne, the Municipal Corporation of the Village of Wyoming, the Municipal Corporation of the Police Village of Dashwood, the Municipal Corporation of the Police Village of Highgate, the Municipal Corporation of the Police Village of Zurich, the Municipal Corporation of the Police Village of Otterville, the Municipal Corpora-

tion of the Police Village of Dublin, the Municipal Corporation of the Police Village of St. Jacobs, the Municipal Corporation of the Police Village of Burgessville and the Municipal Corporation of the Police Village of Springfield are added as parties to the second part of the contract set out in Schedule "A" to *The Power Commission Act, 1909,* as varied, confirmed and amended by the said Act, and as further varied, confirmed and amended by the Act passed in the tenth year of the reign of His late Majesty King Edward VII, chaptered 16, and by subsequent Acts and by this Act, and the said contract shall be binding upon the parties thereto, respectively, as to the City of Sarnia, from the 10th day of February, 1916; as to the Town of Dunnville, from the 10th day of October, 1916; as to the Town of Forest, from the 7th day of October, 1916; as to the Village of Point Edward, from the 10th day of October, 1916; as to the Village of Rodney, from the 7th day of August, 1916; as to the Village of Watford, from the 2nd day of October, 1916; as to the Village of West Lorne, from the 9th day of September, 1916; as to the Village of Wyoming, from the 10th day of February, 1916; as to the Police Village of Dashwood, from the 23rd day of February, 1917; as to the Police Village of Highgate, from the 16th day of May, 1916; as to the Police Village of Zurich, from the 1st day of March, 1917; as to the Police Village of Otterville, from the 13th day of December, 1915; as to the Police Village of Dublin, from the 27th day of November, 1916; as to the Police Village of St. Jacobs, from the 5th day of February, 1917; as to the Police Village of Burgessville, from the 22nd day of November, 1916; and as to the Police Village of Springfield, from the 15th day of November, 1916.

Added to Schedule "B" to contract.

15. The names of the said municipal corporations are added to Schedule "B" of the said contract, and such schedule shall be read as containing the particulars set out in Schedule "A" to this Act.

Contracts with Town of Collingwood, etc., confirmed.

16. The contracts set out in Schedule "B" hereto between the Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Town of Collingwood from the 17th day of February, 1917; the Municipal Corporation of the Town of Midland, from the 14th day of February, 1917; the Municipal Corporation of the Town of Penetanguishene, from the 19th day of February, 1917; the Municipal Corporation of the Town of Stayner, from the 16th day of February, 1917; the Municipal Corporation of the Town of Barrie, from the 19th day of March, 1917; the Municipal Corporation of the Village of Creemore, from the 15th day of February, 1917; the Municipal Corporation of the Village of Coldwater, from the 20th day of February, 1917; the Municipal Corporation of the Police Village of Elmvale, from the 15th day of February, 1917, and the Municipal Corporation of the Township of Tay, from the 27th day of February, 1917, are hereby confirmed and declared to be legal and binding upon the parties thereto, respectively, from their respective dates, and shall not be open to question upon any grounds whatsoever, notwithstanding the requirements of *The Power Commission Act,* or the amendments thereto or any other statute.

Rev. Stat. c. 39.

Contracts with certain townships confirmed.

17. The contracts set out in Schedule "C" hereto between the Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Scarborough, from the 4th day of January, 1917; the Municipal Corporation of the Township of Vaughan, from the 2nd day of October, 1916; the Municipal Corporation of the Township of Townsend, from the 15th day of December, 1916; the Municipal Corporation of the Township of Dereham, from the 17th day of October, 1916; the Municipal Corporation of the Township of South Norwich, from the 23rd day of October, 1916; the Municipal Corporation of the Township of North Norwich, from the 23rd day of October, 1916; the Municipal Corporation of the Township of Chinguacousy, from the 20th day of November, 1916; the Municipal Corporation of the Township of Biddulph, from the 15th day of November, 1916; the Municipal Corporation of the Township of Brantford, from the 4th day of October, 1915; the Municipal Corporation of the Township of Stamford, from the 12th day of March, 1916, are hereby confirmed and declared to be legal, valid and binding upon the parties hereto, respectively, from their respective dates, and shall not be open to question upon any grounds whatsoever, notwithstanding the requirements of *The Power Commission Act,* or amendments thereto, or any other statute.

Other contracts confirmed.

18. The contracts set out in Schedule "D," "E," "F," "G," "H," "I" and "J" hereto between the Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the City of Kingston, from the 4th day of December, 1916; the Municipal Corporation of the Town of Arthur, from the 2nd day of June, 1916; the Municipal Corporation of the Village of Tara, from the 13th day of March, 1916; the Municipal Corporation of the Village of Grand Valley, from the 5th day of June, 1916; the Municipal Corporation of the Township of Artemesia, from the 18th day of February, 1916; the Municipal Corporation of the Township of Brant, from the 6th day of November, 1916, and the Municipal Corporation of the Township of Bentinck, from the 11th day of November, 1916, are hereby confirmed and declared to be legal, valid and binding upon the parties thereto respectively, from their respective dates, and shall not be open to question upon any grounds whatsoever, notwithstanding the requirements of *The Power Commission Act,* or the amendments thereto or any other statute.

Municipal by-laws confirmed.

19. By-laws Nos. 889 and 894 of the Corporation of the City of Sarnia; By-law No. 45 of the Corporation of the City of Kingston; By-laws Nos. 15 and 14 of the Corporation of the Town of Dunnville; By-law No. 461 of the Corporation of the Town of Forest; By-laws Nos. 605 and 607 of the Corporation of the Town of Arthur; By-law No. 873 of the Corporation of the Town of Collingwood; By-law No. 949 of the Corporation of the Town of Midland; By-law No. 535 of the Corporation of the Town of Penetanguishene; By-law No. 540 of the Corporation of the Town of Stayner; By-law No. 905 of the Corporation of the Town of Barrie; By-laws Nos. 282 and 284 of the Corporation of the Village of Tara; By-laws Nos. 187 and 192 of the Corporation of the Village of

Grand Valley; By-laws Nos. 631 and 632 of the Corporation of the Village of Point Edward; By-laws Nos. 115 and 117 of the Corporation of the Village of Rodney; By-laws Nos. 6 and 8 of the Village of Watford; By-laws Nos. 126 and 127 of the Corporation of the Village of West Lorne; By-laws Nos. 307 and 310 of the Corporation of the Village of Wyoming; By-law No. 286 of the Corporation of the Village of Creemore; By-law No. 75 of the Corporation of the Village of Coldwater; By-laws Nos. 189 and 227 of the Corporation of the Police Village of Dashwood; By-laws Nos. 575 and 576 of the Corporation of the Police Village of Highgate; By-laws Nos. 8 and 9 of the Corporation of the Police Village of Zurich; By-laws Nos. 582 and 583 of the Corporation of the Police Village of Otterville; By-laws Nos. 161 and 163 of the Corporation of the Police Village of Dublin; By-law No. 649 of the Corporation of the Police Village of St. Jacobs; By-laws Nos. 760 and 766 of the Corporation of the Police Village of Burgessville; By-laws Nos. 244 and 253 of the Corporation of the Police Village of Springfield; By-law No. 772 of the Corporation of the Police Village of Elmvale; By-laws No. 29 and 30 of the Corporation of the Township of Artemesia; By-law No. 7 of the Corporation of the Township of Bentinck; By-law No. 89 of the Corporation of the Township of Brant; By-law No. 597 of the Corporation of the Township of Tay; By-laws Nos. 925 and 932 of the Corporation of the Township of Scarboro; By-law No. 982 of the Corporation of the Township of Vaughan; By-law No. 350 of the Corporation of the Township of Townsend; By-law No. 720 of the Corporation of the Township of Dereham; By-law No. 597 of the Corporation of the Township of South Norwich; By-law No. 771 of the Corporation of the Township of North Norwich; By-law No. 470 of the Corporation of the Township of Chinguacousy; By-law No. 8 of the Corporation of the Township of Biddulph; By-law No. 698 of the Corporation of the Township of Brantford; By-laws Nos. 23 and 24 of the Township of Stamford are confirmed and declared to be legal, valid and binding upon such corporations and the ratepayers thereof, respectively, and shall not be open to question upon any grounds whatsoever, notwithstanding the requirements of *The Power Commission Act,* or the amendments thereto or of any other statute. Rev. Stat. c. 39.

SCHEDULE "A."

Name of Municipal Corporation.	Quantity of Power applied for in H.P.	Maximum Price of Power at Niagara Falls.	No. of Volts.	Estimate maximum cost of power ready for distribution in Municipality.	Estimate proportionate part of cost to construct transmission line, transformer stations and works for nominally 30,000 H.P., with total capacity of 60,000 H.P.	Estimate proportionate part of line loss and of part cost to operate, maintain, repair, renew and insure transmission line, transformer stations and works for nominally 30,000 H.P., with total capacity of 60,000 H.P.
				$ c.	$ c.	$ c.
Dashwood	50	....	....	56 75	19,016 00	1,144 00
Highgate	50	....	....	51 82	18,415 00	975 00
Zurich	50	....	....	69 34	24,224 00	1,419 00
Otterville	50	....	....	45 00	15,142 00	894 00
Dublin	50	....	....	47 91	17,306 00	889 00
Point Edward	200	....	....	Supplied by Sarnia.		
Dunnville	300	....	....	27 77	44,220 00	2,727 00
Rodney	50	....	4,000	63 00	23,661 00	1,399 00
Forest	100	....	....	63 27	46,985 00	2,404 00
Sarnia	1,500	....	....	38 00	382,755 00	20,061 00
St. Jacobs	35	....	....	42 18	10,243 00	531 00
Watford	100	....	....	59 45	42,671 00	2,291 00
Wyoming	100	....	....	38 34	25,624 00	1,364 00
West Lorne	50	....	4,000	55 60	18,711 00	1,120 00
Burgessville	30	....	....	48 38	10,318 00	551 00
Springfield	20	....	....	65 00	10,540 00	509 00

SCHEDULE "B."

Municipality.	Quantity of Power Applied for in H.P.
Collingwood	1,000
Midland	800
Penetang	600
Stayner	125
Barrie	700
Creemore	75
Coldwater	100
Elmvale	100
Township of Tay	100

This Indenture, made in duplicate the seventeenth day of February, in the year of our Lord one thousand nine hundred and seventeen (1917).

Between:

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part;

and

The Municipal Corporation of the Town of Collingwood, hereinafter called the "Corporation," party of the second part.

Whereas, pursuant to an Act to provide for the transmission of electrical power to municipalities, known as *The Power Commission Act* and amendments thereto, the Commission entered into an agreement with the Corporation for a supply of electrical energy, dated the twenty-fourth (24th) day of July, Nineteen hundred and twelve (1912), (and the ratepayers of the Corporation assented to the by-laws authorizing the Corporation to enter into such an agreement with the Commission for such power);

And whereas, in accordance with the powers conferred by legislation upon the Commission by the said *Power Commission Act* and amendments thereto, the Commission purchased the generating station, hydraulic plant and all works in connection with same belonging to the Simcoe Railway and Power Company, located at what is known as the Big Chute on the Severn River, and all of the transmission lines, sub-stations and transmission equipment also belonging to the said Simcoe Railway and Power Company between the said generating station and the Town of Midland;

And whereas, the purchase of such generating station hydraulic plant, works, transmission lines, sub-stations and all properties belonging to the said Simcoe Railway and Power Company was made for the purpose of supplying to better advantage and with greater efficiency the power requirements of the various municipalities located in the surrounding and adjacent district:

And whereas, in order to comply with such changed conditions it is the desire of both parties that it be declared that the said agreement, dated July 24th, 1912, be terminated and superseded by this agreement as hereinafter set out;

And whereas, the electors of the Corporation assented to by By-law No. 873, authorizing the Corporation to enter into such an agreement:

1. Now therefore this indenture witnesseth, that in consideration of the premises and of the agreements of the Corporation herein set forth, subject to the provisions of the said Act and amendments thereto, the Commission and the Corporation mutually agree with each other as follows:

2. The Commission agrees:

(*a*) To reserve and deliver at the earliest possible date one thousand (1,000) h.p. or more of electrical power to the Corporation.

(*b*) At the expiration of reasonable notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electric power when called for.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Corporation.

(*d*) To deliver commercially continuous 24-hour power every day in the year to the Corporation at the distribution bus bars in the Commission's sub-station within the Corporation's limits.

3. The Corporation agrees:

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement so as to be able to receive power when the Commission is ready to deliver same.

(*b*) To pay annually interest at rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical energy or power taken) of all moneys expended by the Commission on capital account for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract.

Also to pay an annual sinking fund instalment of such an amount as to form at the end of 30 years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power, delivered to the Corporation under the terms of this contract.

Also to pay the Corporation's proportionate part, based as aforesaid, of the cost of lost power and the cost of generating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works. Subject to adjustment under Clause 7 of this agreement.

(*c*) The amounts payable under this contract shall be paid in twelve monthly payments, in gold coin of the present standard of weight and fineness, at the offices of the Commission at Toronto. Bills shall be rendered by the Commission on or before the 5th day of each month and paid by the Corporation on or before the 15th day of each month. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until such bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate.

(*d*) To take electric power exclusively from the Commission during the continuance of this agreement.

(*e*) To co-operate by all means in its power at all times with the Commission to increase the quantity of power required from the Commission, and in all other respects to carry out the objects of this agreement and of the said Act.

(*f*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the eniire month.

(*g*) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for, and on the part of the Commission to hold in reserve, such increased quantity of power in accordance with the terms and conditions of this contract.

(*h*) When the power factor at any time falls below ninety per cent. (90%) the Corporation shall pay for ninety per cent. (90%) of the kilovolt amperes, providing that said ninety per cent. (90%) of said kilovolt amperes is greater than the maximum kilowatts for any twenty (20) minute period during the month.

(*i*) To use at all times first-class, modern, standard commercial apparatus and plant, to be approved by the Commission.

(*j*) To exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Commission and of the Corporation.

4. This agreement shall remain in force for thirty (30) years from the date of execution and completion thereof, subject to Section 10 hereof.

5. (*a*) The power shall be alternating, three-phase, having a periodicity of approximately sixty (60) cycles per second and shall be delivered as aforesaid at a voltage suitable for local distribution.

(*b*) That the meters with their series and potential transformers shall be connected at the point of delivery.

(*c*) That the maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the sub-station in the limits of the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder, and when the voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases and all other electrical characteristics, and qualities are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

6. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

7. The Commission shall at least annually adjust and apportion the amount or amounts payable by the Municipal Corporation or Corporations for such power and such interest, sinking fund, cost of lost power and cost of generating, operating, maintaining, repairing, renewing and insuring said works.

If at any time any other Municipal Corporation, or pursuant to said Act any railway or distributing company, or any other Corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the involved Corporation or Corporations in writing, of a time and place to hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred and paid, and to be paid by the Corporation, appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said works or any part thereof are not adequate for such supply, or if the supply of the Corporation will be thereby injuriously affected, and no power shall be supplied within the limits of a Municipal Corporation taking power from the Commission at the time of such application without the written consent of such Corporation.

In determining the quantity of power supplied to a Municipal Corporation, the quantity supplied by the Commission within the limits of the Corporation to any applicant, other than a Municipal Corporation, shall be computed as part of the quantity supplied to such Corporation, but such Corporation shall not be liable for payment for any portion of the power so supplied. No power shall be supplied by the Municipal Corporation to any railway or distributing company without the written consent of the Commission. Power shall not be sold for less than the cost, and there shall be no discrimination as regards price and quantity.

8. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation or Corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and any other (if any) supplied by the Commission, having regard to the amounts paid by them respectively under the terms of this agreement, and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

9. If differences arise between Corporations to which the Commission is supplying power, the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties, and the Commission shall, in a summary manner, when possible, adjust such differences and such adjustment shall be final.

The Commission shall have all the powers that may be conferred upon a Commissioner appointed under the Act respecting Enquiries Concerning Public Matters.

10. Notwithstanding anything herein contained to the contrary, it is hereby understood and agreed that this agreement shall come into effect upon the date of its approval by the Lieutenant-Governor in Council, or its ratification by the Legislature of the Province of Ontario, and that the said agreement between the parties hereto bearing date the.....day of.....19 , shall thereupon be terminated and become of no effect and be superseded by this agreement.

11. This agreement shall extend to, be binding upon, and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

A. Beck, *Chairman.*

(Seal.)

W. W. Pope, *Secretary.*

MUNICIPAL CORPORATION OF THE TOWN OF COLLINGWOOD.

W. B. H. Patton, *Mayor.*

(Seal.)

J. A. Duncan, *Clerk.*

SCHEDULE "C."

This Agreement made this fourth day of January, A.D. 1917.

Between:

The Hydro-Electric Power Commission of Ontario, herein called the "Commission," party of the first part,

and

The Municipal Corporation of the Township of Scarborough, herein called the "Corporation," party of the second part.

Whereas pursuant to an Act to provide for the transmission of electrical power to municipalities, the Corporation applied to the Commission for a supply of power;

And whereas the Commission has entered into contracts with the Ontario Power Company of Niagara Falls (hereinafter called the Company), for such power;

And whereas the Corporation under the provisions of *The Power Commission Act* and amendments thereto and *The Power Commission Act* of 1911, being "An Act to Provide for the Local Distribution of Electrical Power," has, at the request of a number of ratepayers (petitioners) applied to the Commission for a supply of electrical power or energy, and has passed a by-law, No. 925, to authorize the execution of an agreement therefor.

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreements of the Corporation set forth, subject to the provisions of said Act and amendments and of the said contract, the Commission agrees with the Corporation:

(*a*) To reserve and deliver at the earliest possible date electrical power to the Corporation as required by the Corporation.

(*b*) At the expiration of thirty (30) days notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electrical power as may be required from time to time.

(*c*) To use at all times first-class, modern, standard, commercial apparatus and plant, and to exercise due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Corporation.

(*d*) Power shall be delivered to the Corporation at approximately 2,200 or 4,000 volts, or at any other primary voltage that may be available for the Corporation's use.

(*e*) To supply and construct all 2,200, 4,000 or other lines at primary voltage made necessary by contracts for electric service made between the Corporation and residents or users, within the township, from the Commis-

sion's transformer station or stations to the service transformers of the Corporation, located at such points as the Commission may approve.

2. In consideration of the premises and of the covenants and agreements herein set forth, the Corporation agrees with the Commission:—

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement, so as to be able to give notice as specified in paragraph 1 (*b*).

(*b*) Subject to the provisions of paragraph 2 (*g*) herein, to pay to the Commission monthly, for all power taken, the cost of the power delivered to the Commission, plus the charges in connection with the delivery of the power to the municipality as outlined in clauses 2 (*c*) and (*d*).

(*c*) To pay, annually, in twelve monthly instalments, interest upon its proportionate part of the moneys expended by the Commission on capital account for the construction of lines, transformer stations and other necessary works for the delivery of power to the Corporation; to pay an annual sum for its proportionate part of the cost of the said construction, so as to form in thirty years a sinking fund for the retirement of securities issued by the Province of Ontario; and to bear its proportionate part of the line loss and pay its proportionate part of the cost to operate, maintain, repair, renew and insure the said lines, stations and works. All payments under this paragraph shall be subject to adjustment under paragraph 7.

(*d*) In addition to the cost of power, and the cost of delivering it to the Corporation as provided for in paragraphs 2 (*b*) and (*c*), to pay to the Commission in half-yearly instalments, interest and sinking fund on a thirty-year basis on all capital invested by the Commission in 2,200, 4,000 or other lines of primary voltage as provided for in paragraph 1 (*e*), and to maintain, repair, renew and operate the said lines, and set apart a depreciation fund at the rate of 5 per cent. per annum on all capital expended by the Commission on such construction.

(*e*) The amounts payable in accordance with clause 2 (*b*), and (*c*) and (*d*) shall be paid in gold coin of the present standard of weight and fineness, at the office of the Commission at Toronto, and bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month, except that payments under clause 2 (*d*) shall be made half yearly. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until the said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate.

(*f*) To take power exclusively from the Commission during the continuance of this agreement.

(*g*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during

the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month.

If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the Corporation shall pay for this greater amount of power during the entire month. The taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for and on the part of the Commission to hold in reserve an additional block of power in accordance with the terms and conditions of this contract.

When the power factor of the greatest amount of power taken for said twenty consecutive minutes falls below 90 per cent. the Corporation shall pay for 90 per cent. of said power divided by the power factor.

(*h*) To use at all times first-class, modern, standard, commercial apparatus and plant to be approved by the Commission and to exercise all due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Commission and of the Company.

(*i*) To co-operate, by all means in its power, at all times, with the Commission, to increase the quantity of power required from the Commission and in all other respects to carry out the objects of this agreement and of the said Act.

3. If, as therein provided, the said contracts are continued until the 19th day of December, 1939, this agreement shall remain in force until that date.

4. The power shall be three-phase alternating commercially continuous twenty-four hour power every day of the year except as provided in paragraph 6, having a periodicity of approximately 25 cycles per second, and shall be delivered as aforesaid at a voltage suitable for distribution within the municipality.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery, and shall be subject to test as to accuracy by either party hereto.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery to the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder; and when voltage and frequency are so maintained, the amount of the power, its fluctuations, load factor, power factor, distribution as to phases, and all other electric characteristics and qualities are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. In case the Commission should at any time or times be prevented from supplying said power, or any part thereof, or in case the Corporation shall at any time be prevented from taking said power, or any part thereof, by strike, lock-out, fire, invasion, explosion, act of God, or the King's enemies, or any other cause reasonably beyond their control, then the Commission shall not be bound to deliver such power during such time, and the Corporation shall not be bound to pay the price of said power, during such time.

7. The Commission shall at least annually adjust and apportion the amounts payable by municipal corporations for such power and such interest, sinking fund, line loss, and cost of operating, maintaining, repairing, renewing and insuring the line and works.

8. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation and other municipal corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and other municipal corporations, supplied by the Commission, having regard to the amounts paid by them, respectively, under the terms of this agreement, and such other considerations, as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

9. If at any time any other municipal corporation, or pursuant to said Act, any railway or distributing company, or any other corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the Corporation in writing, of a time and place and hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

10. In case any municipal corporation, or any person, firm or corporation which shall contract with the Commission or with any municipal corporation for a supply of power furnished to the Commission by the Company shall suffer damages by the act or neglect of the Company, and such municipal corporation, person, firm or corporation would, if the Company had made the said contracts directly with them, have had a right to recover such damages or commence any proceedings or any other remedy, the Commission shall be entitled to commence any such proceedings to bring such action for or on behalf of such municipal corporation, person, firm or corporation, and notwithstanding any act, decision or rule of law to the contrary, the Commission shall be entitled to all the rights and remedies of such municipal corporation, person, firm or corporation, including the right to recover such damages, but no action shall be brought by the Commission until such municipal corporation, person, firm or corporation shall have agreed with the Commission to pay any costs that may be adjudged to be paid if such proceedings or action is unsuccessful. The rights and remedies of any such municipal corporation, person, firm or corporation shall not be hereby prejudiced.

11. If any differences arise between Corporations to whom the Commission is supplying power, the Commission may upon application fix a time and place to hear all representations that may be made by the parties, and the Commission shall, in a summary manner when possible, adjust such differences and such adjustment shall be final.

The Commission shall have all the powers that may be conferred upon a Commissioner appointed under the *Act respecting Enquiries concerning Public Matters.*

12. This agreement shall extend to, be binding upon and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

A. Beck, *Chairman.*

(Seal.)

W. W. Pope, *Secretary.*

MUNICIPAL CORPORATION OF THE TOWNSHIP OF SCARBOROUGH.

J. G. Connell,

(Seal.)

W. D. Annis, *Clerk.*

SCHEDULE "C."

Municipality.	*Quantity of Power Applied for in H.P.*
Township of Scarborough.	As required by the Corporation.
" Vaughan.	" " "
" Townsend.	" " "
" Dereham.	" " "
" South Norwich.	" " "
" North Norwich.	" " "
" Chinguacousy.	" " "
" Biddulph.	" " "
" Brantford.	" " "

SCHEDULE "D."

This Indenture made in duplicate the 4th day of December, in the year of our Lord one thousand nine hundred and sixteen (1916).

Between

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part,

and

The Municipal Corporation of the City of Kingston, hereinafter called the "Corporation," party of the second part.

Whereas, by the *Power Commission Act*, passed by the Legislature of the Province of Ontario, Revised Statutes of Ontario, 1914, Chapter 39, and amendments thereto, it was, amongst other things, enacted that any municipal corporation might apply to the Hydro-Electric Power Commission of Ontario for the transmission to such Corporation of electric power and energy for the use of the Corporation and the inhabitants thereof for lighting, heating and power purposes;

And whereas the Corporation has applied to the Commission for a supply of electrical power or energy;

And whereas the Commission is in possession of, and operating in trust for the Ontario Government, the power developments known as the Central Ontario System and can supply therefrom electrical energy sufficient for the needs of the Corporation;

And whereas the electors of the Corporation assented to by-laws authorizing the Corporation to enter into a contract with the Commission for such power;

Now therefore this indenture witnesseth that in consideration of the premises and of the agreements of the parties hereto each agree with the other as follows:

1. The Commission agrees:

(*a*) To reserve for and deliver to the Corporation one thousand two hundred (1,200) or more horse-power of electrical power or energy at the point of delivery hereinafter specified.

(*b*) To reserve and deliver to the Corporation additional electrical power at the expiration of reasonable notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement.

(*c*) To use at all times first-class, modern, standard, commercial apparatus and plant and to exercise all due skill and diligence so that the service rendered to the Corporation hereunder shall be satisfactory.

(*d*) To deliver commercially continuous twenty-four (24) hour power every day in the year, except as provided for herein, at the point of delivery, herein defined as the low tension outlets of the Commission's substation, which the Commission proposes to erect in the City of Kingston.

2. The Corporation agrees:

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power covered by this agreement, so as to be able to receive power on the date of delivery.

(*b*) To pay to the Commission for all power taken or held in reserve in monthly payments in gold coin at Toronto under the following schedule of rates:

For 1,200 h.p. and up to 2,500 h.p., at the rate of $28.00 per h.p. per annum.

When the amount of power taken and held in reserve for the Corporation increases to 2,500 h.p., the rate for all power shall be $27.00 per h.p. per annum; and

When the said power increases to 3,000 h.p., the rate for all power shall be $26.00 per h.p. per annum;

When the said power increases to 3,500 h.p., the rate for all power shall be $25.00 per h.p. per annum;

When the said power increases to 4,000 h.p., the rate for all power shall be $24.00 per h.p. per annum.

Each month's payments are to be made as though the maximum amount taken during that month was taken for the whole month, save that paragraph (*d*) hereof shall govern the minimum.

(*c*) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it for twenty (20) consecutive minutes, the taking of such excess power shall thereafter constitute an obligation on the part of the Corporation to pay for, and on the part of the Commission, as long as this greater amount does not exceed the maximum hereunder, to hold in reserve such increased quantity of power in accordance with the terms and conditions of this agreement.

(*d*) To pay each month to the Commission as a minimum for seventy-five per cent. (75%) of the power held in reserve for the Corporation at the rate fixed herein except as provided for in Clause 5 (*b*) hereof.

(*e*) At all times to take and use the three-phase power in such a manner that the current will be equally taken from the three phases and in no case shall the difference between any two phases be greater than ten per cent. (10%).

(*f*) At all times to so take and use the three-phase power that the ratio of the kilowatts to the kilovolt-amperes is a maximum, but in any event the customer shall pay for at least ninety per cent. (90%) of the maximum kilovolt-amperes considered as true power or kilowatts. The maximum demand in kilovolt-amperes or kilowatts shall be taken as the maximum average or integrated demand over any twenty consecutive minutes.

One horse-power is defined as 0.746 kilowatts.

One kilowatt is defined as the produce of the instantaneous current, voltage and power-factor of the load as shown by a standard polyphase wattmeter and divided by 1,000.

One kilovolt-ampere is defined as the product of the simultaneous average current per phase times the average voltage between phases, times 1,732 and divided by 1,000.

For the purposes of this agreement the kilovolt-amperes may be determined either directly by current and voltage measurements or by the kilowatts divided by the power factor or by any other commercially accurate means as may be approved by the Commission.

The power factor is defined as kilowatts divided by kilovolt-amperes.

(*g*) Bills shall be rendered by the Commission to the Corporation on or before the tenth day, and paid by the Corporation on or before the twentieth day of each calendar month.

If any bill remains unpaid for fifteen (15) days after the date thereof the Commission may, in addition to all other remedies, and without notice, discontinue the supply of power to the Corporation until the said bill is paid, and no such discontinuance by the Commission shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained.

All payments in arrears shall bear interest at the legal rate.

(*h*) To use at all times modern, standard, commercial apparatus and plant to be approved by the Commission from time to time, and to so operate and conduct the plant and apparatus as to cause minimum disturbances or fluctuations to the Commission's supply, and to exercise all due skill and diligence so as to secure the satisfactory operation of the plant and apparatus of both the Commission and the Corporation.

(*i*) Should it be expedient or necessary for the Commission, in order to deliver power hereunder, to construct or build poles, lines, cables, transformers, switches or other appliances or devices on, over or through the property of the Corporation, the Corporation hereby agrees to supply and arrange for such necessary rights-of-way free of cost, and satisfactory to the Commission for the life of this agreement, or renewals thereof, and for thirty (30) days thereafter, so that the Commission may build, erect, construct, operate, repair, maintain and remove any of said apparatus or devices belonging to the Commission.

The power delivered hereunder shall be alternating, three-phase, having a periodicity of approximately 60 cycles per second and a pressure of approximately 2,300 volts between phase wires, subject to normal variations in both frequency and voltage.

4. (*a*) Measurement of the power held in reserve or taken by the Corporation hereunder shall be made by means of a standard polyphase Graphic Recording Wattmeter, and other meters as required, so arranged as to accurately measure and record the power taken by the Corporation.

The greatest average or integrated power demand made by the Corporation for twenty (20) consecutive minutes in any month, as shown by the aforementioned instruments, shall be used as a basis of billing and paying for the power taken by the Corporation hereunder.

(*b*) The point of measuring the power covered by this agreement shall be as near as possible to the point of delivery, and the instruments, with the necessary current and potential transformers for the measurement of power hereunder shall be provided, installed and maintained correct by the Commission.

(*c*) Whenever the said measuring instruments are connected at other than the point of delivery their reading shall be subject to a correction and shall be corrected to give a reading such as would be obtained by instruments connected at the point of delivery. Such corrections shall be based upon tests or calculations by the Commission.

(*d*) Should the point of measurement be located on the premises of the Corporation no rental charge shall be made to the Commission for the location of said instruments or transformers on the Corporation's premises.

(*e*) Access to said instruments and transformers belonging to the Commission shall be free to the Commission at any and all times and the Commission may test, calibrate or remove said measuring instruments and transformers at any reasonable time, but when possible the Corporation shall be advised at least seven days in advance of the Commission's intention to recalibrate, remove or change the measuring instruments.

(*f*) The Corporation shall have the right to test any such measuring instruments in the presence of a representative of the Commission, by giving to the Commission seven days' previous notice in writing of its desire to test such measuring instruments.

(*g*) The Commission shall repair or replace and re-test defective meters or measuring equipment within a reasonable time, but, during the time there is no meter in service it shall be assumed that the power consumed is the same as for the other days of the same month on which a similar load existed.

(*h*) The Corporation shall be responsible for any damage to the property or apparatus furnished by the Commission for the purpose of supplying or measuring power hereunder and installed on the Corporation's property, providing such damage originates from a source external to the said apparatus of the Commission, and is not due to defects in the apparatus of the Commission.

5. (*a*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery shall constitute the supply of power involved herein and a fulfilment of all the operating obligations hereunder, and when the voltage and frequency are so maintained the amount of power, its fluctuations, load factor, power factor, distribution as to phases, and all other characteristics and qualities are under the sole control of the Corporation, his agents, apparatus, appliances and circuits.

(*b*) In case the Commission shall at any time or times be prevented from delivering said power or any part thereof by strikes, lockouts, riot, fire, invasion, explosion, act of God, the King's enemies, or any other cause or causes reasonably beyond its control, then the Commission shall not be bound to deliver such power during such time and the Corporation shall not be bound to pay for such power during such time.

(*c*) The Commission shall be prompt and diligent in removing the cause of such interruption, but the Corporation shall not be bound to pay for such

power during such time. As soon as the cause of such interruption is removed the Commission shall, without any delay, deliver the said power as aforesaid, and the Corporation shall take and use the same.

(*d*) It is further agreed hereby that the Commission shall have the right at reasonable times, and when possible after due notice has been given to the Corporation, to discontinue the supply of power to the Corporation for the purpose of safeguarding life or property, or for the purpose of making repairs, renewals, or replacements to the lines or apparatus of the Commission, but all such interruptions shall be of a minimum duration and when possible arranged for at a time least objectionable to the Corporation.

Such interruptions shall not release the Corporation from its obligations to pay for or resume the use of power when service is restored.

6. A representative or engineer of the Commission appointed for this purpose, may, at any reasonable time during the continuance of this agreement, have access to the premises of the Corporation for the purpose of inspecting the electrical apparatus, plant or property of the Corporation and to take records therefrom as required.

7. It is mutually agreed:

That this agreement shall be binding upon both parties hereto for a period of twenty (20) years, beginning on the day and date when power is first taken hereunder, and this agreement may be extended for a further term of five (5) years upon the mutual agreement of both parties hereto before three (3) months of the expiration of this agreement or any extension or renewal period.

8. The Commission shall be entitled at the termination of this agreement or any extension thereof, or within thirty (30) days thereafter, to remove from the Corporation's premises any and all plant or equipment which may have been installed by the Commission for the supply or measurement of power hereunder.

In witness whereof the said Commission and the said Corporation have duly affixed their respective seals and signatures of their respective officers this fourth day of December, A.D. one thousand nine hundred and sixteen (1916).

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

Signed, sealed and delivered
in the presence of

(Sgd.) W. M. McLachlan.

(Sgd.) A. Beck, *Chairman.*

(Sgd.) W. W. Pope, *Secretary.*

THE MUNICIPAL CORPORATION OF THE CITY OF KINGSTON.

In the presence of

(Sgd.) M. E. Ball.

(Sgd.) Alex. W. Richardson, *Mayor.*

(Sgd.) W. W. Sands, *City Clerk.*

(Seal.)

SCHEDULE "E."

This Indenture made in Duplicate the 2nd day of June, in the year of our Lord, one thousand, nine hundred and sixteen.

Between

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part;

and

The Municipal Corporation of the Town of Arthur, hereinafter called the "Corporation," party of the second part.

Whereas, pursuant to "An Act to Provide for the Transmission of Electrical Power to Municipalities, known as the *Power Commission Act* and amendments thereto," the Corporation applied to the Commission for a supply of power, and the Commission furnished the Corporation with estimates of the total cost of such power, ready for distribution within the limits of the Corporation (and the electors of the Corporation assented to the by-laws authorizing the Corporation to enter into a contract with the Commission for such power).

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreement of the Corporation herein set forth, subject to the provisions of the said Act and amendments thereto, the Commission agrees with the Corporation:

(*a*) To reserve and deliver at the earliest possible date 150 h.p. or more of electrical power to the Corporation.

(*b*) At the expiration of reasonable notice in writing which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electric power when called for.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Corporation.

(*d*) To deliver commercially continuous 24-hour power every day in the year to the Corporation at the distribution bus bars in the Commission's sub-station located at Grand Valley.

2. In consideration of the premises and of the agreement herein set forth, the Corporation agrees with the Commission—

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement so as to be able to receive power when the Commission is ready to deliver same.

(*b*) To pay annually, interest at rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical

energy or power taken), of all the moneys expended by the Commission on capital account for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations, and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract.

Also to pay an annual sinking fund instalment of such amount as to form at the end of 30 years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power, delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, of the cost of lost power and the cost of generating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works, subject to adjustment under Clause 6 of this agreement.

(*c*) The amounts payable under this contract shall be paid in twelve monthly payments, in gold coin of the present standard weight and fineness, at the offices of the Commission at Toronto. Bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate.

(*d*) To take electric power exclusively from the Commission during the continuance of this agreement.

(*e*) To co-operate by all means in its power at all times with the Commission to increase the quantity of power required from the Commission, and in all other respects to carry out the objects of this agreement, and of the said Act.

(*f*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month.

(*g*) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for, and on the part of the Commission to hold in reserve, such increased quantity of power in accordance with the terms and conditions of this contract.

(*h*) When the power factor of the highest average amount of power taken for said twenty consecutive minutes falls below 90% the Corporation shall pay for 90% of said power divided by the power factor.

(*i*) To use at all times first-class, modern, standard commercial apparatus and plant, to be approved by the Commission.

(*j*) To exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Commission and of the Corporation.

3. This agreement shall remain in force for thirty years from date of the first delivery of power under this contract.

4. The power shall be alternating, three-phase, having a periodicity of approximately 60 cycles per second, and shall be delivered as aforesaid at a voltage suitable for local distribution.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery at the Commission's substation located at Grand Valley.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the Commission's substation at Grand Valley shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder, and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases and all other electric characteristics and qualities, are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. The Commission shall at least annually adjust and apportion the amount or amounts payable by the Municipal Corporation or Corporations for such power and such interest, sinking fund, cost of lost power and cost of generating, operating, maintaining, repairing, renewing and insuring said works.

If at any time any other Municipal Corporation, or pursuant to said Act, any railway or distributing company, or any other Corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the involved Corporation or Corporations in writing, of a time and place to hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable, to the Commission, and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said works or any part thereof are not adequate for such supply, or if the supply of the Corporation will be thereby injuriously affected, and no power shall be supplied within the limits of a Municipal Corporation taking power from the Commission at the time of such application, without the written consent of such Corporation.

In determining the quantity of power supplied to a Municipal Corporation, the quantity supplied by the Commission within the limits of the Corporation to any applicant, other than a Municipal Corporation, shall be computed as part of the quantity supplied to such Corporation, but such Corporation shall not be liable for payment for any portion of the power so supplied. No power shall be supplied by the Municipal Corporation to any railway or distributing company without the written consent of the Commission. Power shall not be sold for less than the cost, and there shall be no discrimination as regards price and quantity.

7. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation or Corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and any other (if any) supplied by the Commission, having regard to the amounts paid by them respectively under the terms of this agreement and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

8. If differences arise between Corporations to which the Commission is supplying power, the Commission may upon application fix a time and place and hear all representations that may be made by the parties, and the Commission shall, in a summary manner, when possible, adjust such differences, and such adjustment shall be final. The Commission shall have all the powers that may be conferred upon a Commissioner appointed under the Act respecting Enquiries Concerning Public Matters.

9. This agreement shall extend to, be binding upon, and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

(Sgd.) A. Beck, *Chairman.*
(Sgd.) W. W. Pope, *Secretary.*
(Seal.)

THE MUNICIPAL CORPORATION OF THE TOWN OF ARTHUR.

(Sgd.) D. Brocklebank, *Reeve.*
(Sgd.) D. T. Small, *Clerk.*
(Seal.)

SCHEDULE "F."

This indenture made in duplicate the thirteenth day of March in the year of our Lord, One thousand nine hundred and sixteen.

Between

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part;

and

The Municipal Corporation of the Village of Tara, hereinafter called the "Corporation," party of the second part.

Whereas, pursuant to "An Act to provide for the Transmission of Electrical power to Municipalities, known as *The Power Commission Act*, and amendments thereto," the Corporation applied to the Commission for a supply of power, and the Commission furnished the Corporation with estimates of the total cost of such power, ready for distribution within the limits of the Corporation (and the electors of the Corporation consented to the By-laws authorizing the Corporation to enter into a contract with the Commission for such power).

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreement of the Corporation herein set forth, subject to the provisions of the said Act and amendments thereto, the Commission agrees with the Corporation:

(*a*) To reserve and deliver at the earliest possible date 100 h.p. or more of electrical power to the Corporation.

(*b*) At the expiration of reasonable notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electric power when called for.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Corporation.

(*d*) To deliver commercially continuous 24-hour power every day in the year to the Corporation at the distribution bus bars in the Commission's substation within the Corporation's limits.

2. In consideration of the premises and of the agreement herein set forth, the Corporation agrees with the Commission—

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement so as to be able to receive power when the Commission is ready to deliver same.

(*b*) To pay annually, interest at rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical

energy or power taken), of all moneys expended by the Commission on capital account for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations, and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract.

Also to pay an annual sinking fund instalment of such amount as to form at the end of 30 years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power, delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, on the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works, subject to adjustment under Clause 6 of this agreement.

(*c*) The amounts payable under this contract shall be paid in twelve monthly payments, in gold coin of the present standard of weight and fineness, at the offices of the Commission at Toronto. Bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate.

(*d*) To take electric power exclusively from the Commission during the continuance of this agreement.

(*e*) To co-operate by all means in its power at all times with the Commission to increase the quantity of power required from the Commission, and in all other respects to carry out the objects of this agreement, and of the said Act.

(*f*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month.

(*g*) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for, and on the part of the Commission to hold in reserve, such increased quantity of power in accordance with the terms and conditions of this contract.

(*h*) When the power factor of the highest average amount of power taken for said twenty consecutive minutes falls below 90% the Corporation shall pay for 90% of said power divided by the power factor.

(*i*) To use at all times first-class, modern, standard commercial apparatus and plant, to be approved by the Commission.

(*j*) To exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Commission and of the Corporation.

3. This agreement shall remain in force for thirty years from date of the first delivery of power under this contract.

4. The power shall be alternating, three-phase, having a periodicity of approximately 60 cycles per second, and shall be delivered as aforesaid at a voltage suitable for local distribution.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the substation in the limits of the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder, and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases and all other electric characteristics and qualities, are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. The Commission shall at least annually adjust and apportion the amount or amounts payable by the Municipal Corporation or Corporations for such power and such interest, sinking fund, cost of lost power and cost of generating, operating, maintaining, repairing, renewing and insuring said works.

If at any time any other Municipal Corporation, or pursuant to said Act, any railway or distributing company, or any other Corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the involved Corporation or Corporations in writing, of a time and place to hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said works or any part thereof are not adequate for such supply, or if the supply of the Corporation will be thereby injuriously affected, and no power shall be supplied within the limits of a Municipal Corporation taking power from the Commission at the time of such application, without the written consent of such Corporation.

In determining the quantity of power supplied to a Municipal Corporation, the quantity supplied by the Commission within the limits of the Corporation to any applicant, other than a Municipal Corporation, shall be computed as part of the quantity supplied to such Corporation, but such Corporation shall not be liable for payment for any portion of the power so supplied. No power shall be supplied by the Municipal Corporation to any railway or distributing company without the written consent of the Commission. Power shall not be sold for less than the cost, and there shall be no discrimination as regards price and quantity.

7. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation or Corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and any other (if any) supplied by the Commission, having regard to the amounts paid by them respectively under the terms of this agreement and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

8. If differences arise between Corporations to which the Commission is supplying power, the Commission may upon application fix a time and place and hear all representations that may be made by the parties, and the Commission shall, in a summary manner, when possible, adjust such differences, and such adjustment shall be final. The Commission shall have all the powers that may be conferred upon a Commissioner appointed under the Act respecting Enquiries Concerning Public Matters.

9. This agreement shall extend to, be binding upon, and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

(Sgd.) A. Beck, *Chairman.*
(Sgd.) W. W. Pope, *Secretary.*
(Seal.)

THE MUNICIPAL CORPORATION OF THE VILLAGE OF TARA.

(Sgd.) J. E. Grant, *Reeve.*
(Sgd.) W. J. Taylor, *Clerk.*
(Seal.)

SCHEDULE "G."

This Indenture made in duplicate the fifth day of June, in the year of our Lord, One thousand nine hundred and sixteen.

Between

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part;

and

The Municipal Corporation of the Village of Grand Valley, hereinafter called the "Corporation," party of the second part.

Whereas, pursuant to "An Act to provide for the Transmission of Electrical power to Municipalities, known as *The Power Commission Act*, and amendments thereto," the Corporation applied to the Commission for a supply of power, and the Commission furnished the Corporation with estimates of the total cost of such power, ready for distribution within the limits of the Corporation (and the electors of the Corporation assented to the By-laws No. 187 and 192, authorizing the Corporation to enter into a contract with the Commission for such power).

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreement of the Corporation herein set forth, subject to the provisions of the said Act and amendments thereto, the Commission agrees with the Corporation:

(*a*) To reserve and deliver at the earliest possible date 100 h.p. or more of electrical power to the Corporation.

(*b*) At the expiration of reasonable notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electric power when called for.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Corporation.

(*d*) To deliver commercially continuous 24-hour power every day in the year to the Corporation at the distribution bus bars in the Commission's substation within the Corporation's limits.

2. In consideration of the premises and of the agreement herein set forth, the Corporation agrees with the Commission:

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement, so as to be able to receive power when the Commission is ready to deliver same.

(*b*) To pay annually, interest at rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical

energy or power taken), of all moneys expended by the Commission on capital account for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations, and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract.

Also to pay an annual sinking fund instalment of such amount as to form at the end of thirty years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power, delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, on the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works, subject to adjustment under Clause 6 of this agreement.

(*c*) The amounts payable under this contract shall be paid in twelve monthly payments, in gold coin of the present standard of weight and fineness, at the offices of the Commission at Toronto. Bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate.

(*d*) To take electric power exclusively from the Commission during the continuance of this agreement.

(*e*) To co-operate by all means in its power at all times with the Commission to increase the quantity of power required from the Commission, and in all other respects to carry out the objects of this agreement, and of the said Act.

(*f*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month.

(*g*) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for, and on the part of the Commission to hold in reserve, such increased quantity of power in accordance with the terms and conditions of this contract.

(*h*) When the power factor of the highest average amount of power taken for said twenty consecutive minutes falls below 90% the Corporation shall pay for 90% of said power divided by the power factor.

(*i*) To use at all times first-class, modern, standard commercial apparatus and plant, to be approved by the Commission.

(*j*) To exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Commission and of the Corporation.

3. This agreement shall remain in force for thirty years from date of the first delivery of power under this contract.

4. The power shall be alternating, three-phase, having a periodicity of approximately 60 cycles per second, and shall be delivered as aforesaid at a voltage suitable for local distribution.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the substation in the limits of the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder, and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases and all other electric characteristics and qualities, are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. The Commission shall at least annually adjust and apportion the amount or amounts payable by the Municipal Corporation or Corporations for such power and such interest, sinking fund, cost of lost power and cost of generating, operating, maintaining, repairing, renewing and insuring said works.

If at any time any other Municipal Corporation, or pursuant to said Act, any railway or distributing company, or any other Corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the involved Corporation or Corporations in writing, of a time and place to hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said works or any part thereof are not adequate for such supply, or if the supply of the Corporation will be thereby injuriously affected, and no power shall be supplied within the limits of a Municipal Corporation taking power from the Commission at the time of such application, without the written consent of such Corporation.

In determining the quantity of power supplied to a Municipal Corporation, the quantity supplied by the Commission within the limits of the Corporation to any applicant, other than a Municipal Corporation, shall be computed as part of the quantity supplied to such Corporation, but such Corporation shall not be liable for payment for any portion of the power so supplied. No power shall be supplied by the Municipal Corporation to any railway or distributing company without the written consent of the Commission. Power shall not be sold for less than the cost, and there shall be no discrimination as regards price and quantity.

7. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation or Corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission hnder this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and any other (if any) supplied by the Commission, having regard to the amounts paid by them respectively under the terms of this agreement and such other consideratons as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

8. If differences arise between Corporations to which the Commission is supplying power, the Commission may upon application fix a time and place and hear all representations that may be made by the parties, and the Commission shall, in a summary manner, when possible, adjust such differences, and such adjustment shall be final. The Commission shall have all the powers that may be conferred upon a Commissioner appointed under the Act respecting Enquiries Concerning Public Matters.

9. This agreement shall extend to, be binding upon, and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

(Sgd.) A. Beck, *Chairman.*

(Sgd.) W. W. Pope, *Secretary.*

(Seal.)

CORPORATION OF THE VILLAGE OF GRAND VALLEY.

(Sgd.) Alfred Menary, *Reeve.*

(Sgd.) H. Richardson, *Clerk.*

(Seal.)

SCHEDULE "H."

This Agreement made this 18th day of February, A.D. 1916.

Between:

The Hydro-Electric Power Commission of Ontario, herein called the "Commission," party of the First Part;

and

The Municipal Corporation of the Township of Artemesia, herein called the "Corporation," party of the Second Part.

Whereas pursuant to an Act to provide for the transmission of electrical power to the municipalities the Corporation applied to the Commission for a supply of power;

And whereas the Corporation under the provisions of *The Power Commission Act* and amendments thereto, and *The Power Commission Act of 1911, being "An Act to provide for the Local Distribution of Electrical Power,"* has, at the request of a number of ratepayers (petitioners) applied to the Commission for a supply of electrical power or energy, and has passed a By-law No. 30 to authorize the execution of an agreement therefor;

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreements of the Corporation set forth, subject to the provisions of said Act and amendments and of the said contract, the Commission agrees with the Corporation:—

(*a*) To reserve and deliver at the earliest possible date electrical power to the Corporation as required by the Corporation.

(*b*) At the expiration of thirty (30) days' notice in writing which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electrical power as may be required from time to time.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Corporation.

(*d*) Power shall be delivered to the Corporation at approximately 2,2000 or 4,000 volts, or at any other primary voltage that may be available for the Corporation's use.

(*e*) To supply and construct all 2,200, 4,000 or other lines at primary voltage made necessary by contracts for electric service made between the Corporation and residents or users within the township, from the Commission's power station or transformer stations to the service transformers of the Corporation located at such points as the Commission may approve, except in those parts of the township known as Eugenia and Ceylon.

2. In consideration of the premises and of the covenants and agreements herein set forth, the Corporation agree with the Commission:—

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement, so as to be able to give notice as specified in paragraph 1 (*b*).

(*b*) Subject to the provisions of paragraph (*g*) herein, to pay the Commission monthly for all power taken, the cost of the power to be delivered by the Commission plus the charges in connection with the delivery of power to the municipality, as outlined in clause 2 (*c*) and (*d*).

(*c*) To pay annually interest at the rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical energy or power taken), of all moneys expended by the Commission on capital account for the acquiring of properties and rights, and acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract. Also to pay an annual sinking fund instalment of such amounts as to form at the end of thirty (30) years with accrued interest a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plant, transformer stations, transmission lines, distributing stations and other works necessary for delivery of said electrical energy or power delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, on the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works. Subject to adjustment under clause 8 of this agreement.

(*d*) In addition to the cost of power and cost of delivering it to the Corporation, as provided for in paragraph 2 (*b*) and (*c*), to pay to the Commission in half-yearly instalments interest and sinking fund on a thirty (30) year basis on all capital invested by the Commission in 2,200 volt, 4,000 volt or other lines of primary voltages as provided for in paragraph 1 (*e*), and to maintain, repair, renew and operate the said lines and set aside a depreciation fund at the rate of 5% per annum on all capital expended by the Commission on such construction.

The payments covering cost of construction of primary lines as outlined in this clause 2 (*d*) shall not apply to the portions of the township known as Eugenia and Ceylon, and the capital cost of all primary and secondary distribution lines in these two localities, including all meters, transformers and other equipment necessary for the distribution systems shall be borne entirely by the Corporation, but shall be constructed by the Commission and the Corporation shall make payment to the Commission within thirty (30) days after rendering of account covering moneys spent by the Commission on construction of said primary and secondary distribution lines including all meters, transformers and other necessary equipment as mentioned above, comprising said distribution systems in Eugenia and Ceylon.

(*e*) The amounts payable in accordance with clauses 2 (*b*), (*c*) and (*d*) shall be paid in gold coin of the present standard of weight and fineness, at the office of the Commission at Toronto, and bills shall be rendered by

the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month, except that payments under clause 2 (*d*) shall be made half-yearly. If any bill remains unpaid for 15 days the Commission may, in addition to all other remedies, and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained, and payments in arrears shall bear interest at the legal rate.

(*f*) To take power exclusively from the Commission during the continuance of this agreement.

(*g*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during twenty consecutive minutes three-fourths of the amount of power ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month. If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or the highest average for a period of twenty consecutive minutes, the Corporation shall pay for this greater amount of power during the entire month. The taking of such excess shall therefore constitute an obligation on the part of the Corporation to pay for and on the part of the Commission to hold in reserve an additional block of power in accordance with the terms and conditions of this agreement.

When the power factor of the highest amount of power taken for said twenty consecutive minutes falls below 90% the Corporation shall pay for 90% of the said power factor divided by the power factor.

(*h*) To use at all times first-class, modern, standard commercial apparatus, and plant to be approved by the Commission, and to exercise all due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Commission and of the Company.

(*i*) To co-operate, by all means in its power, at all times, with the Commission, to increase the quantity of power required from the Commission and in all other respects to carry out the objects of this agreement and of the said Act.

3. This agreement shall remain in force for thirty (30) years from the date of the first delivery of power hereunder.

4. The power shall be three-phase, alternating commercially continuous twenty-four hour power every day of the year, except as provided in paragraph 6, having a periodicity of approximately 60 cycles per second, and shall be delivered as aforesaid at a voltage suitable for distribution within the municipality.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery, and shall be subject to test as to accuracy by either party hereto.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery

to the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder; and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases, and all other electric characteristics and qualities are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The engineers of the Commission, or one or more of them or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. In case the Commission should at any time or times be prevented from supplying said power, or any part thereof, or in case the Corporation shall at any time be prevented from taking said power, or any part thereof, by strike, lock-out, fire, invasion, explosion, act of God, or the King's enemies, or any other cause reasonably beyond their control, then the Commission shall not be bound to deliver such power during such times, and the Corporation shall not be bound to pay the price of said power, during such time.

7. The Commission shall at least annually adjust and apportion the amounts payable by municipal corporations for such power and such interest, sinking fund, line loss, and cost of operating, maintaining, repairing, renewing and insuring the lines and works.

8. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation and other municipal corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and other municipal corporations supplied by the Commission, having regard to the amounts paid by them respectively, under the terms of this agreement, and such other considerations, as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

9. If at any time any other municipal corporation or pursuant to said Act, any railway or distributing company, or any other corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the Corporation in writing, of a time and place and hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favor of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

10. In case any municipal corporation, or any person, firm or corporation which shall contract with the Commission or with any municipal corporation for a supply of power furnished to the Commission by the

Company shall suffer damages by the act of neglect of the Company, and such municipal corporation, person, firm or corporation would, if the Company had made the said contracts directly with them have had a right to recover such damages or commence any proceedings or any other remedy, the Commission shall be entitled to commence any such proceedings to bring such action for or on behalf of such municipal corporation, person, firm or corporation, and notwithstanding any act, decision or rule of law to the contrary, the Commission shall be entitled to all the rights and remedies of such municipal corporation, person, firm or corporation, including the right to recover such damages, but no action shall be brought by the Commission until such municipal corporation, person, firm or corporation shall have agreed with the Commission to pay any costs that may be adjudged to be paid if such proceedings or action are unsuccessful. The rights and remedies of any such municipal corporation, person, firm or corporation shall not be hereby prejudiced.

11. If differences arise between corporations to whom the Commission is supplying power, the Commission may, upon application fix a time and place to hear all representations that may be made by the parties and the Commission shall, in a summary manner when possible, adjust such differences and such adjustment shall be final.

The Commission shall have all the powers that may be conferred upon a Commission appointed under *The Act respecting Enquiries Concerning Public Matters.*

12. This agreement shall extend to, be binding upon and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO,

(Sgd.) A. Beck, *Chairman.*

(Seal.)

(Sgd.) W. W. Pope, *Secretary.*

MUNICIPAL CORPORATION OF THE TOWNSHIP OF ARTEMESIA.

(Sgd.) T. R. McKenzie, *Reeve.*

(Seal.)

(Sgd.) W. J. Ballamy, *Clerk.*

SCHEDULE "I."

This agreement made this 6th day of November, A.D. 1916,

Between:

The Hydro-Electric Power Commission of Ontario, herein called the "Commission," party of the First Part;

and

The Municipal Corporation of the Township of Brant in the County of Bruce, herein called the "Corporation," party of the Second Part.

Whereas, pursuant to an Act to provide for the transmission of electrical power to the municipalities, the Corporation applied to the Commission for a supply of power.

And whereas the Corporation, under the provisions of *The Power Commission Act* and amendments thereto, and *The Power Commission Act of 1911*, being "an Act to provide for the Local Distribution of Electrical Power," has, at the request of a number of ratepayers (petitioners), applied to the Commission for a supply of electrical power or energy, and has passed a by-law, No. 89, to authorize the execution of an agreement therefor.

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreements of the Corporation set forth, subject to the provisions of said Act and amendments, and of the said contract, the Commission agrees with the Corporation:—

(*a*) To reserve and deliver at the earliest possible date electrical power to the Corporation, as required by the Corporation.

(*b*) At the expiration of thirty (30) days' notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electrical power as may be required from time to time.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Corporation.

(*d*) Power shall be delivered to the Corporation at approximately 2,200 or 4,000 volts, or at any other primary voltage that may be available for the Corporation's use.

(*e*) To supply and construct all 2,200 volt, 4,000 volt or other lines at primary voltage made necessary by contracts for electric service made between the Corporation and residents or users within the township, from the Commission's power station or transformer stations to the service transformers of the Corporation located at such points as the Commission may approve, except in that part of the township known as Elmwood, and it is hereby understood and agreed upon by both parties hereto that all the cost of the primary, secondary and street lighting, distribution systems located within the hamlet of Elmwood and upon the streets of same, shall

be paid for direct by the Corporation, including all meters, transformers, services, street lighting brackets, poles, wires, cross arms, and any equipment necessary to serve the consumers within the said hamlet of Elmwood.

2. In consideration of the premises and of the covenants and agreements herein set forth, the Corporation agrees with the Commission:—

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement, so as to be able to give notice as specified in paragraph 1 (*b*).

(*b*) Subject to the provisions of clause (*g*), section 2 herein, to pay the Commission monthly for all power taken, the cost of the power to be delivered by the Commission, plus the charges in connection with the delivery of power to the municipality, as outlined in clauses 2 (*c*) and (*d*).

(*c*) To pay annually interest at the rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical energy or power taken), of all moneys expended by the Commission on capital account for the acquiring of properties and rights, and acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract. Also to pay an annual sinking fund instalment of such amount as to form at the end of thirty (30) years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plant, transformer stations, transmission lines, distributing stations and other works necessary for delivery of said electrical energy or power delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, of the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations, and other necessary works. Subject to adjustment under clause 8 of this agreement.

(*d*) In addition to the cost of power and cost of delivering it to the Corporation, as provided for in paragraph 2 (*b*) and (*c*), to pay to the Commission in half-yearly instalments interest and sinking fund on a thirty (30) year basis on all capital invested by the Commission in 2,200 volt, 4,000 volt, or other lines of primary voltage as provided for in paragraph 1 (*e*), and to maintain, repair, renew and operate the said lines and set aside a depreciation fund at the rate of 5 per cent. per annum on all capital expended by the Commission on such construction.

The payments covering cost of construction of primary lines as outlined in this clause 2 (*d*) shall not apply to the portion of the township known as Elmwood, and the capital cost of all primary, secondary and street lighting and distribution lines in this locality, including all meters, transformers, and other necessary equipment for the distribution system, shall be borne entirely by the Corporation, but shall be constructed by the Commission and the Corporation shall make payment to the Commission within thirty (30) days after rendering of account covering moneys spent by the Commission on construction of said primary, secondary, and street

lighting distribution lines, including all meters, transformers and other necessary equipment as mentioned above, comprising the said distribution system in the hamlet of Elmwood.

(*e*) The amounts payable in accordance with clauses 2 (*b*), (*c*) and (*d*) shall be paid in gold coin of the present standard of weight and fineness, at the office of the Commission at Toronto, and bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month, except that payments under clause 2 (*d*) shall be made half-yearly. If any bill remains unpaid for 15 days the Commission may, in addition to all other remedies, and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained, and payments in arrears shall bear interest at the legal rate.

(*f*) To take power exclusively from the Commission during the continuance of this agreement.

(*g*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes same or not. When the highest average amount of power taken for any twenty (20) consecutive minutes during any month shall exceed during twenty (20) consecutive minutes three-fourths of the amount of power ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month. If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or the highest average for a period of twenty (20) consecutive minutes, the Corporation shall pay for this greater amount of power during the entire month. The taking of such excess shall therefore constitute an obligation on the part of the Corporation to pay for and on the part of the Commission to hold in reserve, an additional block of power in accordance with the terms and conditions of this agreement.

When the power factor at any time falls below ninety per cent. (90%), the Corporation shall pay for ninety per cent. (90%) of the kilovolt amperes, providing that said ninety per cent. (90%) of said kilovolt amperes is greater than the maximum kilowatt for any twenty (20) minute period during the month.

(*h*) To use at all times first-class, modern, standard, commercial apparatus and plant to be approved by the Commission and to exercise all due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Commission and of the Corporation.

(*i*) To co-operate by all means in its power, at all times, with the Commission, to increase the quantity of power required from the Commission and in all other respects to carry out the objects of this agreement and of the said Act.

3. This agreement shall remain in force for thirty (30) years from the date of the first delivery of power hereunder.

4. The power shall be three-phase, alternating commercially continuous twenty-four hour power every day of the year, except as provided in

paragraph 6, having a periodicity of approximately 60 cycles per second, and shall be delivered as aforesaid at a voltage suitable for distribution within the municipality.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery, and shall be subject to test as to accuracy by either party hereto.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery to the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder; and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases, and all other electric characteristics and qualities are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right, from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. In case the Commission should at any time or times be prevented from supplying said power, or any part thereof, or in case the Corporation shall at any time be prevented from taking said power, or any part thereof, by strike, lock-out, fire, invasion, explosion, act of God, or the King's enemies, or any other cause reasonably beyond their control, then the Commission shall not be bound to deliver such power during such times, and the Corporation shall not be bound to pay the price of said power, during such times.

7. The Commission shall at least annually adjust and apportion the amounts payable by municipal corporations for such power and such interest, sinking fund, line loss, and cost of operating, maintaining, repairing, renewing and insuring the lines and works.

8. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation and other municipal corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property upon all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and other municipal corporations supplied by the Commission, having regard to the amounts paid by them respectively, under the terms of this agreement, and such other considerations, as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

9. If at any time any other municipal corporation or pursuant to said Act, any railway or distributing company, or any other corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the corporation in writing, of a time and place and hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

10. If differences arise between corporations to whom the Commission is supplying power, the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties and the Commission shall, in a summary manner, when possible, adjust such differences and such adjustment shall be final.

The Commission shall have all the powers that may be conferred upon a Commissioner appointed under *The Act respecting Enquiries Concerning Public Matters.*

11. This agreement shall extend to, be binding upon and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO,

(Sgd.) A. Beck, *Chairman.*

(Seal.)

(Sgd.) W. W. Pope, *Secretary.*

THE MUNICIPAL CORPORATION OF THE TOWNSHIP OF BRANT IN THE COUNTY OF BRUCE.

(Sgd.) R. S. Nesbitt, *Reeve.*

(Seal.)

(Sgd.) M. A. McCallum, *Clerk.*

SCHEDULE "J."

This Agreement made this 11th day of November, A.D. 1916,

Between:

The Hydro-Electric Power Commission of Ontario, herein called the "Commission," party of the First Part.

and

The Municipal Corporation of the Township of Bentinck in the County of Grey, herein called the "Corporation," party of the Second Part.

Whereas, pursuant to an Act to provide for the Transmission of Electrical Power to the Municipalities, the Corporation applied to the Commission for a supply of power;

And whereas the Corporation, under the provisions of *The Power Commission* Act and amendments thereto and *The Power Commission Act of 1911*, being "An Act to Provide for the Local Distribution of Electrical Power," has, at the request of a number of ratepayers (petitioners) applied to the Commission for a supply of electrical power or energy, and has passed a By-law No. 7 to authorize the execution of an agreement therefor.

1. Now, therefore, this indenture witnesseth that, in consideration of the premises and of the agreements of the Corporation set forth, subject to the provisions of said Act and amendments and of the said contract, the Commission agrees with the Corporation:—

(*a*) To reserve and deliver at the earliest possible date electrical power to the Corporation as required by the Corporation.

(*b*) At the expiration of thirty (30) days' notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electrical power as may be required from time to time.

(*c*) To use at all times first-class, modern, standard commercial apparatus and plant, and to exercise due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Corporation.

(*d*) Power shall be delivered to the Corporation at approximately 2,200 or 4,000 volts, or at any other primary voltage that may be available for the Corporation's use.

(*e*) To supply and construct all 2,200 volt, 4,000 volt or other lines at primary voltage made necessary by contracts for electric service made between the Corporation and residents or users within the Township, from the Commission's power station or transformer stations to the service transformers of the Corporation located at such points as the Commission may approve, except in that part of the Township known as Elmwood, and it is hereby understood and agreed upon by both parties hereto that all of the cost of the primary, secondary, and street lighting distribution systems located within the hamlet of Elmwood and upon the streets of same, shall be paid for direct by the Corporation, including all meters, transformers, services, street lighting brackets, poles, wires, cross arms, and any equipment necessary to serve the consumers within the said hamlet of Elmwood.

2. In consideration of the premises and of the covenants and agreements herein set forth, the Corporation agrees with the Commission:—

(*a*) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement, so as to be able to give notice as specified in paragraph 1 (*b*).

(*b*) Subject to the provisions of clause (*g*), section 2 herein, to pay the Commission monthly for all power taken, the cost of the power to be delivered by the Commission, plus the charges in connection with the delivery of power to the Municipality, as outlined in clauses 2 (*c*) and (*d*).

(*c*) To pay annually interest at the rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical energy or power taken), of all moneys expended by the Commission

on capital account for the acquiring of properties and rights, and acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract. Also to pay an annual sinking fund instalment of such amount as to form at the end of thirty (30) years with accrued interest a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all moneys advanced by the Province of Ontario for the acquiring of properties and rights, the acquiring and construction of generating plant, transformer stations, transmission lines, distributing stations and other works necessary for delivery of said electrical energy or power delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, of the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works. Subject to adjustment under clause 8 of this agreement.

(*d*) In addition to the cost of power and cost of delivering it to the Corporation, as provided for in paragraph 2 (*b*) and (*c*), to pay to the Commission in half-yearly instalments interest and sinking fund on a thirty (30) year basis on all capital invested by the Commission in 2,200 volt, 4,000 volt or other lines of primary voltage as provided for in paragraph 1 (*e*), and to maintain, repair, renew and operate the said lines and set aside a depreciation fund at the rate of 5 per cent. per annum on all capital expended by the Commission on such construction.

The payments covering cost of construction of primary lines as outlined in this clause 2 (*d*) shall not apply to the portion of the Township known as Elmwood and the capital cost of all primary, secondary and street lighting and distribution lines in this locality, including all meters, transformers, and other necessary equipment for the distribution system, shall be borne entirely by the Corporation, but shall be constructed by the Commission and the Corporation shall make payment to the Commission within thirty (30) days after rendering of account, covering moneys spent by the Commission on construction of said primary, secondary and street lighting distribution lines, including all meters, transformers and other necessary equipment as mentioned above, comprising the said distribution system in the hamlet of Elmwood.

(*e*) The amounts payable in accordance with clauses 2 (*b*), (*c*) and (*d*) shall be paid in gold coin of the present standard of weight and fineness, at the office of the Commission at Toronto, and bills shall be rendered by the Commission on or before the 5th day, and paid by the Corporation on or before the 15th day of each month, except that payments under clause 2 (*d*) shall be made half-yearly. If any bill remains unpaid for fifteen days the Commission may, in addition to all other remedies, and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained, and payments in arrears shall bear interest at the legal rate.

(*f*) To take power exclusively from the Commission during the continuance of this agreement.

(*g*) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes same or not. When the highest average amount of power taken

for any twenty (20) consecutive minutes during any month shall exceed during twenty (20) consecutive minutes three-fourths of the amount of power rendered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month. If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or the highest average for a period of twenty (20) consecutive minutes, the Corporation shall pay for this greater amount of power during the entire month. The taking of such excess shall, therefore, constitute an obligation on the part of the Corporation to pay for and on the part of the Commission to hold in reserve an additional block of power in accordance with the terms and conditions of this agreement.

When the power factor at any time falls below ninety per cent. (90%), the Corporation shall pay for ninety per cent. (90%) of the kilovolt amperes, providing that said ninety per cent. (90%) of said kilovolt amperes is greater than the maximum kilowatts for any twenty (20) minute period during the month.

(*h*) To use at all times first-class, modern, standard, commercial apparatus and plant to be approved by the Commission and to exercise all due skill and diligence, so as to secure the most perfect operation of the plant and apparatus of the Commission and of the Corporation.

(*i*) To co-operate by all means in its power, at all times, with the Commission, to increase the quantity of power required from the Commission and in all other respects to carry out the objects of this agreement and of the said Act.

3. This agreement shall remain in force for thirty (30) years from the date of the first delivery of power hereunder.

4. The power shall be three-phase, alternating commercially continuous twenty-four hour power every day of the year, except as provided in paragraph 6, having a periodicity of approximately 60 cycles per second, and shall be delivered as aforesaid at a voltage suitable for distribution within the municipality.

(*a*) That the meters with their series and potential transformers shall be connected at the point of delivery, and shall be subject to test as to accuracy by either party hereto.

(*b*) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery to the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder; and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases, and all other electric characteristics and qualities are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. In case the Commission should at any time or times be prevented from supplying said power, or any part thereof, or in case the Corporation shall at any time be prevented from taking said power, or any part thereof, by strike, lock-out, fire, invasion, explosion, act of God, or the King's enemies, or any other cause reasonably beyond their control, then the Commission shall not be bound to deliver such power during such times, and the Corporation shall not be bound to pay the price of said power, during such times.

7. The Commission shall at least annually adjust and apportion the amounts payable by municipal corporations for such power and such interest, sinking fund, line loss, and cost of operating, maintaining, repairing, renewing and insuring the lines and works.

8. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation and other municipal corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and other municipal corporations supplied by the Commission, having regard to the amounts paid by them, respectively, under the terms of this agreement, and such other considerations, as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

9. If at any time any other municipal corporation or pursuant to said Act, any railway or distributing company, or any other corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the Corporation in writing, of a time and place and hear all representations that may be made as to the terms and conditions of such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

10. If differences arise between corporations to whom the Commission is supplying power, the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties, and the Commission shall, in a summary manner, when possible, adjust such differences, and such adjustment shall be final.

The Commission shall have all the powers that may be conferred upon a Commissioner appointed under *The Act respecting Enquiries Concerning Public Matters.*

11. This agreement shall extend to, be binding upon and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO,

(Sgd.) A. Beck, *Chairman.*

(Seal.) (Sgd.) W. W. Pope, *Secretary.*

MUNICIPAL CORPORATION OF THE TOWNSHIP OF BENTINCK IN THE COUNTY OF GREY.

(Sgd.) George Brown, *Reeve.*

(Seal.) (Sgd.) Jno. Herbert Chittick, *Clerk.*

The Legislature also passed the Act, set out hereafter, entitled "*An Act to amend The Water Powers Regulation Act.*"

An Act to amend The Water Powers Regulation Act.

Assented to 12th April, 1917.

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

Short title.

1. This Act may be cited as *The Water Powers Regulation Act, 1917.*

6 Geo. V. c. 21, amended.

2. *The Water Powers Regulation Act, 1916,* is amended by adding thereto the following section:—

Report of Inspector that owner is exceeding his rights as to development.

13.—(1) Where the inspector reports that the owner of a water power,

(*a*) is diverting or using more water than such owner is entitled to divert or use; or

(*b*) is developing or generating a greater amount of power in horse-power, than such owner is entitled to develop or generate; or

(*c*) has installed works and equipment capable of developing or generating a greater amount of power in horse-power than such owner is entitled to develop or generate,

Appointment of Commission. Rev. Stat. c. 18.

the Lieutenant-Governor in Council may appoint three commissioners, who shall be Judges of the Supreme Court of Ontario, to hold an enquiry under *The Public Enquiries Act,* and report to the Lieutenant-Governor in Council as to,

(*a*) the quantity of water in cubic feet per second which such owner is entitled to divert or use;

(*b*) the amount of power in horse-power which such owner is entitled to develop or generate;

(*c*) the extent, if any, by which the capacity of the works installed or equipped by the owner, exceeds the amount of power in horse-power which the owner is entitled to develop or generate; and

(*d*) as to the price and terms and conditions upon which having regard to all the circumstances and to the rights of the owner as ascertained by the commissioners, the

power to the extent of such excess should be delivered to the Hydro-Electric Power Commission of Ontario as hereinafter provided; and

(*e*) as to such other matters connected with or arising out of the subject matter of the references as they may deem expedient.

Where Commission finds that owner is exceeding his rights.

(2) If the Commissioners find that the owner is diverting or using more water than he is entitled to divert or use, or is developing or generating a greater amount of power in horse-power than he is entitled to develop or generate, or that he has installed and equipped works exceeding in capacity the amount of power which he is entitled to develop or generate, the Lieutenant-Governor in Council may order the owner to deliver to the Hydro-Electric Power Commission of Ontario, upon the date named in the order, such amount of electrical power or energy as shall equal such excess as found by the report of the Commissioners, or to operate the works of the owner to their full capacity and to deliver such excess power to the Hydro-Electric Power Commission of Ontario.

Order requiring delivery of surplus power to H.-E. P. Commission.

Penalty for disobedience to order.

(3) If the owner refuses or neglects to deliver such power after notice in writing so to do, he shall incur a penalty of $1,000 per diem for every day during which such neglect or default continues, to be recoverable by action in the Supreme Court at the suit of the Attorney-General of Ontario.

Other liabilities of owner not affected.

(4) Nothing in this section contained shall affect or diminish any duty or obligation as to payment of any penalty or rental to which the owner might otherwise be liable for exceeding the amount of power which he is entitled to develop or generate, and all such penalties may be collected and all such rentals shall be due and payable and the like proceedings may be taken by the Crown or by any commission or other public body from which the rights or franchises of the owner are derived, as if this Act had not been passed.

An Act was also passed authorizing the construction and operation of works for the development of electrical energy at Niagara Falls.

An Act to authorize the Construction and Operation of Works for the Development of Electrical Power and Energy in the Vicinity of Niagara Falls by the Hydro-Electric Power Commission of Ontario on behalf of Certain Municipal Corporations.

Assented to 12th April, 1917.

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

Short title.

1. This Act may be cited as *The Ontario Niagara Development Act, 1917.*

Interpretation.

2. In this Act,

"Commission."

(*a*) "Commission" shall mean the Hydro-Electric Power Commission of Ontario;

"Government."

(*b*) "Government" shall mean the Lieutenant-Governor in Council acting for and on behalf of the Province of Ontario.

Commission authorized to construct and operate works.

3. The Commission shall have and may exercise all the powers set out in section 3 of *The Ontario Niagara Development Act* for the construction and operation of the works in the said section mentioned, for the supply of electrical or pneumatic power or energy to municipal corporations which have heretofore entered or may hereafter enter into contracts with the Commission for the supply of electrical or pneumatic power or energy from the Niagara River or Welland River.

Purchase of works authorized.

4. For the purpose of securing a supply of electrical power or energy from the waters of the Niagara River or Welland River, the Commission with the approval of the Lieutenant-Governor in Council may exercise any of the powers set out in clauses *a* to *h* of section 8 of *The Power Commission Act.*

Cost of power at place of development.

5.—(1) Notwithstanding anything contained in any contract heretofore entered into between the Commission and any municipal corporation or corporations or in any general or special Act fixing the maximum price of power to municipal corporations at Niagara Falls, every municipal corporation which has heretofore entered into or which may hereafter enter into a contract for the supply of electrical or pneumatic power or energy by the Commission from the Niagara River, shall pay to the Commission a sum equal to the average cost per horse-power to the Commission of all the power supplied to the municipal corporations under contract with the Commission for the supply of power from Niagara Falls and the vicinity.

(2) In fixing the amount per horse-power so payable by a municipal corporation, the Commission shall take into account the amount payable per horse-power by the Commission to any company or individual operating works for the development of power from Niagara Falls and the vicinity, and the amount required for payment of interest on the sums expended by the Commission upon the construction and equipment of the works, and to form a sinking fund sufficient to provide for the repayment of such amounts and to provide renewals and such other charges as the Commission may deem necessary and proper. Considerations in fixing cost to municipalities.

(3) The cost to municipal corporations of the power supplied to them by the Commission from any source at Niagara Falls, or in the vicinity of the Niagara River, shall be annually adjusted and apportioned by the Commission as provided by *The Power Commission Act.* Annual adjustment of cost. Rev. Stat. c. 39.

(4) The column No. 3 in Schedule "B" of the agreement dated the 4th day of May, 1908, and set out in Schedule "A" of *The Power Commission Amendment Act, 1909,* is struck out and the following substituted therefor:— 9 Edw. VII, c. 19, Schedule amended.

MAXIMUM PRICE OF POWER AT NIAGARA FALLS.

"The average cost per horse-power to the Commission of power developed by the Commission or procured under contract with any corporation or individual developing power at Niagara Falls, to be annually adjusted and apportioned by the Commission as set out in section 8 of *The Ontario Niagara Development Act, 1917.*"

(5) Except as qualified or amended by this Act, all the terms of the said agreement of the 4th day of May, 1908, shall continue in force and apply as far as practicable in the same manner and to the same extent as if this Act had not been passed. Agreement of 4th May, 1908, as amended, to be in force.

6.—(1) It is hereby declared that the Commission is to be a trustee of all the works constructed or acquired under the authority of this Act for the municipal corporations which have heretofore entered or may hereafter enter into contracts with the Commission for a supply of electrical power or energy from Niagara Falls or the vicinity, but the Commission shall be entitled to a lien upon the said works until all sums expended by the Commission on account of the construction and equipment of such works have been paid. Commission to hold works as trustee for municipalities.

(2) Upon the payment of the amounts expended by the Commission upon the construction and equipment of the works, the Commission shall determine and adjust the rights of the municipal corporations, having regard to the amounts paid by them respectively, and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council. Adjustment of rights of municipal corporations.

Contracts with companies, etc.

7.—(1) Subject to the approval of the Lieutenant-Governor in Council, the Commission may contract from time to time with any company or individual for the supply of electrical power or energy from the works constructed or acquired under the authority of this Act to such company or individual.

Application of profits.

(2) Any nett profit made by the Commission in supplying power under subsection 1, after making provision for the cost of acquiring, constructing and maintaining the works by means of which the power or energy is supplied, shall be applied in payment of the cost of maintaining the works constructed or acquired and operated by the Commission.

Park Commissioners may convey lands to Commission.

8.—(1) The Commissioners for the Queen Victoria Niagara Falls Park may convey to the Commission such lands in what is commonly known as the Chain Reserve on the banks of the Niagara River, as may be required for the purposes of the works authorized in section 3 of this Act, and any portion of the fore-shore or bank of the Niagara River which lies in front of the land forming the said Chain Reservation, and the said Commissioners may enter into an agreement with the Commission to take over any lands acquired by the Commission and not actually in use for the purposes of the Commission, and to lay out, fence, improve and care for such lands as part of the Queen Victoria Niagara Falls Park, but the terms of every such conveyance and agreement shall be subject to the approval of the Lieutenant-Governor in Council.

Authority to execute necessary instruments.

(2) The Commissioners for the Queen Victoria Niagara Falls Park and the Commission shall have authority, subject to the approval of the Lieutenant-Governor in Council, to execute all necessary conveyances and other instruments for the purpose of carrying out any agreement entered into under subsection 1.

Issue of bonds by Commission.

9.—(1) The Commission, with the approval of the Lieutenant-Governor in Council, may issue bonds, debentures or other securities of the Commission for any of the purposes set out in sections 3 and 4 and in such form, and containing such terms, and at such rate of interest and payable in such manner and at such time or times as the Lieutenant-Governor in Council may determine.

Provincial guarantee of bonds.

(2) Section 14*c* of *The Power Commission Act* shall apply to the bonds, debentures and other securities which may be issued by the Commission under the authority of subsection 1.

An Act was also passed amending *The Public Utilities Act* and contains references to Hydro-Electric Power Commission matters.

An Act to amend *The Public Utilities Act.*

Assented to 12th April, 1917.

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

1. Section 32 of *The Public Utilities Act* is repealed and the following substituted therefor:— Rev. Stat. c. 204, s. 32, repealed.

32. Subject to the provisions of section 39 of *The Power Commission Act,* and notwithstanding anything in *The Municipal Act* contained, revenues arising from supplying any public utility or from the property connected with any public utility work, after providing for the expenses and maintenance of the works, shall be paid over to the treasurer of the municipality to be applied annually to the reduction or extinguishment of the rates required to be levied under any by-law for the issue of debentures of the municipality for the construction, extension or improvement of the works, and it shall not be necessary to levy any general rate to provide for sinking fund and interest or other payments on account of such debentures, except to the extent to which the revenues on hand are insufficient to meet the annual payments falling due on account of principal and interest of the debentures. Application of revenue—from public utility.

2. Subsection 1 of section 34 of *The Public Utilities Act* as amended by section 29 of *The Statute Law Amendment Act, 1916,* is repealed and the following substituted therefor:— Rev. Stat. c. 204, s. 34, subs. 1, repealed.

(1) Subject to the provisions of subsections 1*a* to 1*e*, the council of a municipal corporation which owns or operates works for the production, manufacture or supply of any public utility or is about to establish such works, and the council of a township corporation which has entered into a contract with the Hydro-Electric Power Commission of Ontario for a supply of electrical power or energy in the township, may, by by-law passed with the assent of the municipal electors, provide for entrusting the construction of the works and the control and management of the same to a commission to be called "The Public Utilities Commission of the (*naming the municipality*)," or in the case of such township, "The Hydro-Electric Commission of the Township of (*naming the township*)," or to a commission established under this Part. Establishment of municipal commission.

Appointment of commission for village.

Rev. Stat. c. 39.

(1*a*) Where the corporation of a village has entered into a contract with the Hydro-Electric Power Commission of Ontario, under *The Power Commission Act,* for a supply of electrical power or energy a commission may be established by by-law of the council under the provisions of this Part for the control and management of the construction, operation and maintenance of all works undertaken by the corporation for the distribution and supply of such electrical power or energy, and it shall not be necessary that such by-law receive the assent of the electors.

Village commissions heretofore established.

(1*b*) Every such commission heretofore established by the council of a village shall be deemed to have been lawfully established, and the by-law establishing such commission shall be deemed to be and to have been legal, valid and binding from the time of the passing thereof, notwithstanding that such by-law was passed and such commission was established without the assent of the electors first having been obtained.

Repeal of village by-law establishing commission.

(1*c*) A by-law passed by the council of a village for the establishment of a commission without the assent of the electors may be repealed by the council at any time and it shall not be necessary to obtain the assent of the electors to such repeal.

Assent of electors.

(1*d*) Where a by-law establishing a commission in a village has been passed with the assent of the electors the by-law may be repealed with the like assent.

Effect of repeal.

(1*e*) Upon the repeal of a by-law establishing a commission under this section, the control and management of the works shall be vested in the council and the commission shall cease to exist.

Rev. Stat. c. 204, s. 38, amended.

3. Section 38 of *The Public Utilities Act* is amended by adding thereto the following subsection:—

Salaries of municipal commissioners to be approved by Commission.

(2) Where a commission is established which has the control and management of works constructed for the distribution of electrical power or energy supplied by the Hydro-Electric Power Commission of Ontario, the salary or other remuneration of the commissioners, so far as the same is chargeable to such works, shall be subject to the approval of the Hydro-Electric Power Commission of Ontario.

Rev. Stat. c. 204, s. 45, subs. 3, amended.

4. Subsection 3 of section 45 of *The Public Utilities Act* is amended by inserting after the word "utility" in the sixth line thereof the words, "for the purpose of cutting off the supply of such utility or of making an inspection from time to time to determine whether such utility has been or is being unlawfuly used or."

The following agreement for the Purchase of Stock in Company by the Hydro-Electric Power Commission was entered into:—

AGREEMENT made this twelfth day of April, A.D. 1917;

BETWEEN:

JOHN JOSEPH ALBRIGHT, of Buffalo, in the State of New York, on behalf of himself and other Stockholders of The Ontario Power Company of Niagara Falls (hereinafter called the Vendor),

of the First Part;

—and—

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO (hereinafter called the Purchaser),

of the Second Part;

—and—

HIS MAJESTY THE KING, herein represented by the Lieutenant-Governor in Council of the Province of Ontario, acting by Sir William Hearst, Prime Minister of the said Province, (hereinafter called the Guarantor),

of the Third Part;

—and—

THE ONTARIO POWER COMPANY OF NIAGARA FALLS (hereinafter called the Power Company),

of the Fourth Part;

—and—

THE ONTARIO TRANSMISSION COMPANY, LIMITED (hereinafter called the Transmission Company),

of the Fifth Part;

—and—

NIAGARA, LOCKPORT AND ONTARIO POWER COMPANY (hereinafter called the Lockport Company),

of the Sixth Part;

WHEREAS, the Power Company has an issued and outstanding capital stock of Ten Million Dollars ($10,000,000) par, amount represented by One Hundred Thousand shares of the par value of One Hundred Dollars ($100.00) each—

NOW THIS AGREEMENT WITNESSETH that, in consideration of the covenants, agreements and considerations herein contained, the parties respectively covenant and agree the one with the other as follows:—

APPENDIX "C."

FIRST: The Vendor agrees to sell to the Purchaser and the Purchaser agrees to purchase from the Vendor, ninety thousand (90,000) shares of the par value of one hundred dollars ($100.00) each, of the capital stock of the Power Company and the remaining ten thousand (10,000) shares of said stock of the par value of one million dollars ($1,000,000) to the extent that the holders thereof put the Vendor in a position to make delivery of such shares to the Purchaser prior to the time for completion as hereinafter defined.

SECOND: The consideration for the said sale shall be:

(*a*) The sum of eight million dollars ($8,000,000), or such portion of said sum as shall equal eighty per cent. (80%) of the par amount of the shares of said stock of the Power Company transferred and delivered to the Purchaser at the time for completion as hereinafter defined, which sum the Purchaser hereby agrees to pay and satisfy by the issue and delivery to the Vendor of the debentures of the Purchaser guaranteed as hereinafter provided for, bearing date on the date of the said time for completion in such denominations being multiples of one hundred dollars ($100.00) as the Vendor shall require, payable forty years from the said date and bearing interest at the rate of four per cent. (4%) per annum, payable half-yearly, said debentures being payable as to principal and interest in Toronto, Canada; New York, United States of America, and/or London, England, at the option of the holders; the said debentures as to both principal and interest to be payable in gold coin of the present standard of weight and fineness of the country where same shall be paid; and, unless otherwise agreed between the Vendor and the Purchaser, interest coupons to be attached to said debentures and the said debentures and the coupons attached thereto to be in the forms set out in Schedule "A" to this agreement, or to the like effect with any variations or additions which the Vendor may before the time for completion required to secure listing and quotation of same on any exchange or exchanges; said debentures and coupons to be engraved or lithographed, the debentures to be sealed with the seal of the Purchaser and signed by the Chairman and Secretary, and the coupons to be signed by the Secretary; the signature of the coupons to be either written or lithographed or engraved as the Purchaser may determine. Provided that in lieu of delivering at the time for completion said lithographed or engraved debentures the Purchaser may issue and deliver interim debentures with or without coupons, such interim debentures and coupons, if any, to be in such form and in such denominations as the Vendor may be willing to accept and to be guaranteed as to principal and interest in the same manner as is provided for in respect of said lithographed or engraved debentures, and to entitle the holder or holders thereof to said lithographed or engraved debentures as soon as the same are prepared in exchange for an equal amount of said interim debentures, and to give to the holder or holders thereof, or of any coupons attached thereto, pending such exchange, every right which the holder or holders of said lithographed or engraved debentures would have; and if interim debentures are delivered, the said lithographed or engraved debentures shall be prepared and made ready to be exchanged therefor within two months from the time for completion as hereinafter defined, and shall be exchanged for said interim debentures as and when said interim debentures are delivered to the Purchaser after said lithographed or engraved debentures are so prepared and made ready; and

(*b*) The execution and delivery by the Purchaser of an agreement with the Vendor and the Toronto General Trusts Corporation, which, unless otherwise agreed between the Vendor and the Purchaser, shall be in the form set out in Schedule "B" of this agreement, and which the Purchaser agrees with the Vendor to execute and deliver at the time for completion as hereinafter defined.

THIRD: It is understood between the Vendor and the Purchaser, and the Purchaser agrees with the Vendor, that before the time for completion as hereinafter defined, the Vendor may cause or procure the Power Company to do and the Power Company may do all such things as may be requisite or proper to be done *so that at the time for completion as hereinafter defined the respective assets of the Power Company and the Transmission Company will consist only of those described in Schedule "C"* to this agreement. And it is further understood between the Vendor and the Purchaser, and the Vendor agrees with the Purchaser that the Vendor will cause or procure the Power Company and the Transmission Company to do all such things as may be required or

proper to be done so that the respective liabilities (whether direct, indirect, contingent, accruing or accrued) of the said companies at the time for completion as hereinafter defined, shall be only those described in Schedule "D" to this agreement, and in default of so doing or in so far as he shall not so do the Vendor will pay or settle all such liabilities.

The Power Company and the Purchaser severally agree with the Vendor that should the Power Company and/or the Transmission Company before the time for completion have sold or assigned any assets of either Company, such as accounts receivable or other choses in action, and should such assets not have been collected or reduced to possession by the owner or owners thereof, the Power Company and/or the Transmission Company will, from time to time, at the request and expense of the Vendor, use all reasonable means to collect and get in such of said assets or the proceeds thereof as the Vendor may specify, and will account for and pay and deliver over such assets or proceeds, as the case may be, from time to time received by the Power Company and/or the Transmission Company to the Vendor or the person or persons respectively entitled thereto.

The Vendor agrees with the Power Company and the Purchaser that in addition to the assets set out in said Schedule "C" hereto, there shall be left in the hands of the Power Company at the time for completion a sum estimated by the Vendor to be equal to—

(*a*) Interest and Sinking Fund payments on the bonds and debentures of the Power Company and the Transmission Company mentioned in the said Schedule "D" which shall have accrued but shall not be due at the time for completion, and

(*b*) The proper proportion of all rentals and payments to the Commissioners of the Queen Victoria Niagara Falls Park, and of all unpaid rates, taxes and assessments for the year 1917, adjusted to the time for completion, and if such estimate shall, after completion, prove inaccurate, the excess or deficiency when determined shall be paid by the Vendor to the Power Company, or by the Power Company or the Purchaser to the Vendor as the case may require.

The assets of the Power Company at the time for completion are not intended to include any rentals, sums or moneys payable or to become payable for power supplied or otherwise, under any lease or contract which shall have accrued or shall have been earned, but shall not be due or payable at the time for completion, and if they do include any such items the Purchaser shall use every reasonable effort to collect such items, and if and when collected shall pay, or procure to be paid, to the Vendor, the amount thereof adjusted to the time for completion, and the Purchaser shall also at the time for completion pay or procure to be paid to the Vendor the value of all prepaid insurance, rentals, taxes, rates (including local improvement rates), assessments and payments for telephone services adjusted to the time for completion.

FOURTH: The Purchaser shall have thirty days from the date hereof within which to examine the real property titles of the Power Company and of the Transmission Company. The Vendor shall not be obliged to deliver any abstract of title or to incur any expense in connection with the investigation of said titles, but the Purchaser shall search the said titles entirely at its own expense. The Vendor will permit the Purchaser or procure the Purchaser to be permitted to inspect all documents relating to the titles which may be in the possession or power of the Power Company or the Transmission Company. If any objection or requisition in respect of said titles shall be made by the Purchaser which the Vendor may for any reason whatsoever be unwilling to comply with or to remove whether able to do so or not, the Vendor shall

have the right to rescind this agreement by written notice to the Purchaser, of his election to do so, and such right may be exercised notwithstanding any attempt to remove or to comply with or any partial removal or compliance with any such objection or requisition, and notwithstanding any negotiations which may have been had between the parties with reference thereto. If the Purchaser shall not have made any specific requisition or objection to the said titles within the said period of thirty days, or if all specific requisitions or objections made within the said period of thirty days shall have been removed or complied with or waived, the Purchaser shall be deemed to have accepted the titles of the Power Company and of the Transmission Company; provided always that the Purchaser may waive all such objections or requisitions by giving notice in writing to that effect to the Vendor at any time within fifteen days from the receipt of such notice of rescission, and upon such notice of waiver being given this agreement shall remain in full force and effect as though such objections or requisitions had never been made.

FIFTH: Upon the completion of the sale under this agreement, the Vendor agrees that he will tender or cause to be tendered the resignation of all members of the Boards of Directors of the Power Company and of the Transmission Company, and also that he will tender or cause to be tendered the resignation of all officers of said companies respectively, or will terminate, or cause to be terminated, their employment, and that the Boards of Directors of the Power Company and the Transmission Company will at that time respectively assist the Purchaser in acceptance of such resignations and in the election of new directors nominated by the Purchaser.

SIXTH: The Vendor agrees that the Power Company and the Transmission Company will, until the time for completion as hereinafter defined, repair and keep in repair and in good working order and condition, reasonable wear and tear only excepted, all the present buildings, erections, plant, machinery and fixtures of said companies and all additions thereto, and will, pending said time for completion and, except as otherwise expressly provided for herein, carry on the respective businesses of said companies in the usual and ordinary manner, but in case any loss or damage which would involve an expenditure of more than two hundred and fifty thousand dollars ($250,000) shall occur, the Vendor may, by notice in writing addressed to the Purchaser, rescind this agreement, unless the Purchaser shall, by notice in writing, waive the above covenants to repair, rebuild or make good, and agree to accept, in lieu thereof, an assignment of the rights of the Vendor, the Power Company and the Transmission Company, or of any one or more of them (if any), to such insurance moneys as may be payable in respect thereof; provided that the Vendor shall not, nor shall the Power Company or the Transmission Company proceed with any such repairs, rebuilding or making good until one week after it shall have submitted the plans thereof to the Purchaser and shall have considered any representations or suggestions which the Purchaser may make in respect thereof. In case there shall be an obligation to repair, rebuild and make good under the foregoing provisions, and the Vendor shall not have rescinded this agreement under the provisions of this clause, the completion of this agreement shall not be thereby delayed, but the assets of the Power Company will be restored by the inclusion therein of a sum estimated in good faith by the Vendor to be equal to the reasonable cost of such repair, rebuilding, or making good, or so much thereof as shall not have been finished or paid for at the time for completion, and should said sum prove to be less than such reasonable cost the difference when determined shall be paid by the Vendor to the Power Company. Neither the Vendor, the Power Company nor the Transmission Company shall be obliged to make any betterments or improvements to the property of either company, but if any such improvements shall be deemed expedient by either company, the Vendor shall cause the Purchaser to be notified in case the expenditure in respect of any one item shall exceed five hundred dollars ($500.00) and the Purchaser shall pay the Vendor in cash at the

time for completion as hereinafter defined, a portion of all expenditures made by either company for the betterment or improvement of the property of either company from the date hereof up to said time for completion in respect of—

(*a*) Items not exceeding five hundred dollars ($500.00) and

(*b*) All items exceeding five hundred dollars ($500.00) in respect of which the Purchaser shall have consented to the expenditure in writing, which portion shall bear the same proportion to the total amount of such expenditure as the amount of stock of the Power Company delivered to the Purchaser in completing this agreement bears to the total issued capital stock of the Power Company.

The Vendor agrees with the Purchaser that until the time for completion, as hereinafter defined, neither the Power Company nor the Transmission Company will surrender any of the franchise rights or privileges granted to them, or either of them, or do, omit or permit to be done or omitted, any act or thing whereby any such particular rights or privileges may become forfeited or terminated, or liable to forfeiture or termination.

SEVENTH: The Guarantor agrees with the Vendor and the Purchaser and each of them to guarantee and hereby guarantees to the respective holders thereof for the time being the due payment by the Purchaser of the interest and principal of all debentures of the Purchaser to be delivered under the terms of this agreement, and the Guarantor further agrees that a guarantee duly executed by the Guarantor and guaranteeing to the Holder thereof for the time being payment of the interest and principal thereof by the Purchaser, shall be endorsed upon each of said debentures of the Purchaser so to be delivered prior to the delivery thereof hereunder, such guarantee, unless altered by consent, to be in the form set out in Schedule "A" to this agreement or to the like effect; and the Guarantor further agrees with the Vendor and the Purchaser, and each of them, to guarantee and hereby guarantees to the Vendor and to the Toronto General Trusts Corporation and its successors and assigns the due performance and observance by the Purchaser of the agreement between the Purchaser and the Vendor and the Toronto General Trusts Corporation to be executed by the Purchaser under the provisions of clause (*b*) of the second section of this agreement.

EIGHTH: The Lockport Company, the Power Company and the Purchaser mutually agree:—

(*a*) That on the first day of April, 1950, if all the now outstanding bonds of the Lockport Company shall have been paid and retired on or before that date, and otherwise as soon after the first day of April, 1950, as all of the said bonds of the Lockport Company shall have been paid and retired, and in any event not later than the first day of November, 1954, the existing contract between the Power Company and the Lockport Company, evidenced by four agreements made between the Lockport Company and the Power Company, and dated, respectively, the 16th day of July, 1904; the 30th day of December, 1904; the 31st day of October, 1905, and the 30th day of December, 1913, (hereinafter called the existing power supply contract) and any extension or renewal of or right of either party thereto to extend or renew the same shall cease and determine; and

(*b*) That in case the Power Company shall at any time or times be prevented by any competent authority other than the Legislature or Government of the Province of Ontario, or by strike, lock-out, riot, fire, invasion, explosion, act of God or the King's enemies, or any other cause, reasonably beyond its control, from delivering to the Lockport Company the power deliverable under the existing power supply contract, or any extension or renewal thereof, or any part of such power, or in case the Lockport Company shall at any time be so prevented from taking such power or any part thereof,

then the Power Company shall not be bound to deliver such power during such time or times or be liable for any penalties or damages or deductions for non-delivery during such time or times, and the Lockport Company shall not be bound to pay for such power during such time or times, but as soon as the cause of such interruption is removed, the Power Company shall, without any delay, deliver the said power as aforesaid, and the Lockport Company shall take the same, and each of the said parties (the Power Company and the Lockport Company) shall, so far as such party can do so, and as early as possible, remove and overcome such cause or causes of interruption.

The Lockport Company covenants with the Power Company and the Purchaser, and each of them, that all the said bonds of the Lockport Company will be paid and retired before or on the first day of November, 1954.

The Power Company agrees with the Lockport Company and the Purchaser agrees with and guarantees to the Lockport Company, and agrees with and guarantees to the Vendor that the Power Company will duly abide by, observe and perform the existing power supply contract between the Power Company and the Lockport Company (as varied by this agreement) and all extensions or renewals thereof; and the Purchaser and the Guarantor undertake and agree with the Power Company, the Lockport Company, the Transmission Company and the Vendor, to use their best endeavours from time to time with the Government and Parliament of Canada and with the Legislature of Ontario to place and keep the Power Company and the Transmission Company at all times in such a position that they and each of them may lawfully carry out the terms of the existing power supply contract between the Power Company and the Lockport Company (as varied by this agreement) and any extensions or renewals thereof so far as relates to the export of the power required for the purpose of such contract, as so varied, and any extensions or renewals thereof.

The Purchaser, the Power Company and the Lockport Company mutually agree that except as by this paragraph (eighth) varied, the existing power supply contract shall continue and remain in full force and effect.

NINTH: This agreement shall not take effect or be binding upon the parties hereto unless and until it shall have been executed and delivered by all the said parties.

TENTH: The Vendor agrees with the Purchaser that neither the Power Company nor the Transmission Company will, before the time for completion as hereinafter defined, create or issue any further shares or their capital stocks, respectively, or any bonds, debentures or like securities.

ELEVENTH: The Vendor agrees with the Purchaser that the Vendor will, from time to time, after the completion of this Agreement, upon the request and at the expense of the Purchaser, furnish to the Purchaser any and all information in connection with any and all of the affairs of the Power Company and the Transmission Company which the vendor may have in his possession or under his control.

TWELFTH: The time for completion of this agreement shall be the first day of the calendar month which shall fall next after sixty (60) days from the execution and delivery of this agreement by all the parties thereto, and if such execution and delivery shall not have taken place by the first day of June, 1917, this agreement shall be void; provided that the Vendor and Purchaser may agree in writing to an extension or extensions of the said date, and of the said time for completion, or either of them, and every such agreement shall be binding on all parties hereto, and if and as often as the time for completion shall be extended the time to which it is extended shall thereafter be taken to be the time for completion for the purposes of this agreement.

THIRTEENTH: The completion of this agreement shall take place at the office of the Purchaser at Toronto, Ontario.

FOURTEENTH: The Power Company and the Transmission Company assent, and each of them assents, to this agreement, and the Power Company and the Transmission Company agree, and each of them agrees, with the Vendor that they and each of them will, at the expense of the Vendor, facilitate in all reasonable ways the due carrying out of all the terms of this agreement to be carried out by the Vendor, and that they and each of them on its part will do and cause to be done all such acts and things as the Vendor hereby agrees to cause or procure to be done by the Power Company and the Transmission Company or either of them.

FIFTEENTH: Time shall be of the essence of this agreement.

SIXTEENTH: The obligations of the Guarantor hereunder shall extend to his successors; and the obligations of every other party hereunder shall bind the successors and assigns of such party if a corporation and the executors, administrators and assigns of such party if a person; and all rights of and benefits to any party hereunder shall extend and enure to the successors and assigns of such party if a corporation, and to the executors, administrators and assigns of such party if a person.

In witness whereof these presents have been duly executed by the parties hereto the day and year first above written.

Witness:
(Signed) W. K. KOESTER,

(Signed) JOHN JOSEPH ALBRIGHT,

The Hydro-Electric Power Commission of Ontario.

(Signed) A. BECK, *Chairman.*
(Signed) W. W. POPE, *Secretary.*

(Signed) J. W. JENKINS.

(Signed) W. H. HEARST, *Prime Minister.*

The Ontario Power Company of Niagara Falls.

By
JOHN JOS. ALBRIGHT, *President.*
ROBERT C. BOARD, *Secretary.*

The Ontario Transmission Company of Niagara Falls.

By
JOHN JOS. ALBRIGHT, *President.*
ROBERT C. BOARD, *Secretary.*

Niagara, Lockport and Ontario Power Company.

By
FRED D. COREY, *President.*
HARRY E. NICHOLS, *Secretary.*

SCHEDULE "A" REFERRED TO IN THE ANNEXED AGREEMENT.

FORM OF DEBENTURE.

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No.....

£.....

The Hydro-Electric Power Commission of Ontario (hereinafter called "the Commission") for value received, hereby promises to pay to the bearer, or, if registered, to the registered holder hereof, on the ..... day of ..... 19 , on presentation and surrender of this debenture, the sum of ..... dollars, at ..... in Toronto, Canada, or at ..... in New York, United States of America, or the sum of ..... pounds sterling, at ..... in London, England, at the holder's option, with interest thereon, until paid, at the rate of four per centum per annum, payable half-yearly, at any of said places, at the holder's option, on the first day of ..... and the first day of ..... in each year, on presentation and surrender of the interest coupons hereto annexed as they severally become due; each payment of principal and interest to be made in gold coin of the present standard of weight and fineness of the country where same shall be made.

This debenture shall pass by delivery, but may be registered as to principal in the name of the holder in a register which shall be kept by the Commission at its office in Toronto, Canada, in which case it can only be transferred by an instrument in writing, signed by the registered holder or his lawful attorney, and registered in the said register. A transfer to bearer may subsequently be registered, after which this debenture shall be transferable by delivery alone until again registered in the name of the holder. Notwithstanding registration, the interest coupons shall continue payable to bearer.

This debenture is issued under the authority of an Act of the Legislative Assembly of the Province of Ontario, entitled ..... and being Chapter ..... of the Statutes of Ontario (1917) passed in the seventh year of the reign of His Majesty King George V.

In witness whereof the Commission has caused its corporate seal to be hereunder affixed and this debenture to be signed by ..... and ..... this ..... day of ....., 19 .

.....

(Seal)

.....

FORM OF INTEREST COUPON.

Debenture No. .....

Interest Coupon No. .....

The Hydro-Electric Power Commission of Ontario will pay to the bearer on the ..... day of ..... dollars at ..... in Toronto, Canada, or at ..... in New York, United States of America, or ..... pounds sterling, at ..... in London, England, at the bearer's option; such payment to be made in gold coin of the present standard of weight and fineness of the country where same shall be made, and being the half-year's interest on debentures No. ..... payable on the ..... day of .....19 .

Dated the ..... day of ..... 19 .

FORM OF GUARANTEE FOR ENDORSEMENT ON DEBENTURES.

By virtue of powers conferred by the Legislature of the Province of Ontario, Canada, the Province of Ontario hereby guarantees to the holder of the within bond for the time being and to the holder for the time being of any of the coupons attached thereto, due payment of the principal of the within debenture and of the interest thereon, according to the tenor of the said debenture and of the coupons attached thereto.

SCHEDULE "B" REFERRED TO IN THE ANNEXED AGREEMENT.

This Agreement made this ..... day of ..... A.D. 1917:

BETWEEN:

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO, (hereinafter called "the Commission"),

of the First Part;

—and—

JOHN JOSEPH ALBRIGHT, of Buffalo, in the United States of America, hereinafter called "the Vendor"),

of the Second Part;

—and—

THE TORONTO GENERAL TRUSTS CORPORATION, representing and acting herein for the benefit of the various holders for the time being of the various bonds and debentures hereinafter mentioned, (hereinafter called "the Trustees"),

of the Third Part;

WITNESSETH THAT—

FIRST: For divers valuable considerations and in consideration of one dollar ($1.00) of lawful money of Canada, paid by the Vendor and the Trustees to the Commission, receipt of all which considerations the Commission hereby acknowledge, the Commission hereby covenants with the Vendor and the Trustees and each of them—

(1) That the Ontario Power Company of Niagara Falls (hereinafter called the Power Company) will duly pay, as the same become due, the outstanding first mortgage five per cent., forty-year sinking fund gold bonds of the Power Company, amounting on the 31st December, 1916, to the sum of nine million nine hundred and eighty-four thousand dollars ($9,984,000) and all interest thereon and sinking fund payments connected therewith secured by mortgage dated the 2nd of February, 1903, between the Power Company and the Trustees, and Supplementary Agreement dated the 1st October, 1908, between the Power Company and Francis Ralston Welsh, and others, and will perform, abide by and observe all the covenants, agreements, provisoes and obligations on the part of the Power Company in the said bonds, and/or in the said mortgage and supplementary agreement contained; and

(2) That the Power Company will duly pay as the same become due the outstanding 6 per cent. gold coupon debentures of the Power Company, payable as to principal on the 1st day of July, 1921, amounting on the 31st December, 1916, to two million eight hundred and eighty thousand dollars ($2,880,000) and all interest thereon

and sinking fund payments connected therewith, secured by indenture dated 30th June, 1906, made between the Power Company and the Trustees, and by a second mortgage, dated 2nd November, 1914, between the Power Company and National Trust Company, Limited, and will perform, abide by and observe all the covenants, agreements, provisoes and obligations on the part of the Power Company in the said debentures, and/or in the said indenture and/or mortgage contained; and

(3) That the Power Company and/or the Ontario Transmission Company, Limited (hereinafter called the Transmission Company), will duly pay as the same become due the outstanding 5 per cent. first mortgage gold bonds of the Transmission Company, payable as to principal on the first day of May, 1945, amounting on the said 31st December, 1916, to one million eight hundred and five thousand dollars ($1,805,000) and all interest thereon and sinking fund payments connected therewith secured by a first mortgage, dated 16th August, 1905, between the Transmission Company and the Trustees, and two certain agreements, the one dated 20th April, 1910, between the Power Company, the Transmission Company, the Trustees and the Holders from time to time of the 5 per cent. first mortgage gold bonds of the Transmission Company, and the other dated 11th June, 1910, between the Transmission Company, the Standard Trust Company of New York, the Power Company and the Holders from time to time of the said 5 per cent. first mortgage gold bonds of the Transmission Company, and will perform, abide by and observe all the covenants, agreements, provisoes and obligations on the part of the Transmission Company, and/or the Power Company in the said bonds of the Transmission Company and/or in the said mortgage, and/or in the said agreements dated respectively 20th April, 1910, and 11th June, 1910, contained.

SECOND: This agreement shall bind the Commission, its successors and assigns and enure to the benefit of the executors, administrators and assigns of the Vendor and the successors and assigns of the Trustees.

In witness whereof, these presents have been duly executed by the parties hereto the day and year first above written.

Witness:

W. K. KOESTER.

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

BY .....
Chairman.

.....
Secretary.

(Sgd.) JOHN JOSEPH ALBRIGHT.

THE TORONTO GENERAL TRUSTS CORPORATION.

BY .....

SCHEDULE "C" REFERRED TO IN THE ANNEXED AGREEMENT.

ASSETS OF THE POWER COMPANY AND/OR THE TRANSMISSION COMPANY.

(*a*) All freehold and leasehold lands, tenements and hereditaments of the Power Company and/or the Transmission Company, including the house in the City of Niagara Falls, Ontario, standing in the name of R. C. Board.

(*b*) All contracts between the Power Company and/or the Transmission Company and the Commissioners of the Queen Victoria Niagara Falls Park, and all rights and privileges thereunder.

(*c*) All franchises, easements, water powers, water privileges and water rights of the Power Company and/or the Transmission Company.

(*d*) All works, buildings, fixtures, plant, machinery, equipment and apparatus of every kind of the Power Company and/or the Transmission Company.

(*e*) All documents, including plans, records, contracts, and specifications of the Power Company and/or the Transmission Company.

(*f*) All furniture, chattels, stock-in-trade, stores, licenses, patent rights, prepaid insurance and books of account and other books of the Power Company and/or the Transmission Company, including items described as "work orders" and "working assets."

(*g*) All interest of the Power Company and/or the Transmission Company in all contracts and engagements mentioned or described under letters (*e*), (*f*), (*g*), (*h*) and (*l*) in schedule "D" to the annexed agreement.

(*h*) All the shares in the capital stock of the Transmission Company, said shares being owned by the Power Company.

SCHEDULE "D" REFERRED TO IN THE ANNEXED AGREEMENT.

LIABILITIES OF THE POWER COMPANY AND/OR THE TRANSMISSION COMPANY.

(*a*) First mortgage five per cent. bonds of the Power Company, and interest thereon, and sinking fund payments connected therewith; said bonds amounting on the 31st December, 1916, to the sum of nine million nine hundred and eighty-four thousand dollars ($9,984,000), and all covenants, agreements, obligations and liabilities of the Power Company, in or under the mortgage dated 2nd February, 1903, between the Power Company and the Toronto General Trusts Corporation and/or the supplemental agreements dated 1st October, 1908, between the Power Company and Francis Ralston Welsh and others, securing said bonds.

(*b*) Six per cent. (6%) gold coupon debentures of the Power Company and interest thereon and sinking fund payments connected therewith, said debentures amounting on the 31st December, 1916, to the sum of two million eight hundred and eighty thousand dollars ($2,880,000), and all covenants, agreements, obligations and liabilities of the Power Company, in or under the indenture dated 30th June, 1906, made between the Power Company and the Toronto General Trusts Corporation and/or the second mortgage, dated 2nd November, 1914, made between the Power Company and National Trust Company, Limited, securing said debentures.

(*c*) All obligations and liabilities of the Power Company as guarantors or otherwise in respect of the first mortgage gold bonds of the Transmission Company, including

all such obligations and liabilities under any covenant, agreement or guarantee relating to said bonds.

(*d*) First mortgage five per cent. gold bonds of the Transmission Company, and interest thereon, and sinking fund payments connected therewith, said bonds amounting on the 31st December, 1916, to one million eight hundred and five thousand dollars ($1,805,000), and all covenants, agreements, obligations and liabilities of the Transmission Company, in or under the mortgage dated August 16th, 1905, made between the Transmission Company and the Toronto General Trusts Corporation, and/or two certain agreements, the one dated 20th April, 1910, made between the Power Company, the Transmission Company, the Toronto General Trusts Corporation, and the Holders from time to time of the five per cent. first mortgage gold bonds of the Transmission Company, and the other dated 11th June, 1910, made between the Transmission Company, the Standard Trust Company of New York, the Power Company and the Holders from time to time of the said first mortgage gold bonds of the Transmission Company.

(*e*) All obligations and liabilities of the Power Company and/or the Transmission Company under any and all contracts or agreements between the Power Company and/or the Transmission Company and the Commissioners of the Queen Victoria Niagara Falls Park.

(*f*) All obligations and liabilities of the Power Company and/or the Transmission Company under all power supply contracts (whether made originally by the Power Company and/or the Transmission Company or otherwise), with the following parties:—

Niagara, Lockport and Ontario Power Company,
Canadian Steel Foundries, Limited,
Canada Cement Company, Limited,
Canadian Ramapo Iron Works,
Electro-Metals, Limited,
Department of Railways and Canals,
Coniagas Reduction Company,
American Cyanamid Company,
Town of Merritton,
Hydro-Electric Power Commission,
The Norton Company,
Dain Manufacturing Company, Limited,
Cronmiller & White Brewing Company,
C. Reichman & Son,
James Battle,
Page, Hersey Iron Tube and Lead Company, Limited,
The Robinson Bros. Cork Co., Limited,
Ontario Paper Company, Limited,
Charles T. Grantham (Empire Cotton Mills),
Metals-Chemical, Limited,
A. E. Augustine,
Beaver Wood Fibre Company, Limited,
Corporation of Port Colborne,
Humberstone Village,
Humberstone Summer Resort,
H. J. Shore,
Ideal Baking Company,
Humberstone Shoe Company,
P. Noxel,
Woods & Son,
R. A. Wilson,
E. Reeb.

(*g*) All obligations and liabilities of the Power Company and/or the Transmission Company, under three contracts for the purchase of power from the Toronto Power Company of Ontario, Limited, dated respectively, September 5th, 1914; October 13th, 1915, and March 17th, 1916.

(*h*) All written contracts and engagements which the Power Company and/or the Transmission Company may make or enter into in the ordinary course of business prior to the time for completion.

(*i*) All leases and contracts for crossings, rights of way and pole, wire, cable and transmission rights and privileges which the Power Company and/or the Transmission Company shall hold, possess or be liable for at the time for completion, and all liabilities and obligations in respect of rentals or otherwise thereunder.

(*j*) All assessments, rates and taxes, including local improvement rates.

(*k*) Obligation of Power Company for commissions on all power sold to Ontario Paper Company, Limited, and Beaver Wood Fibre Company, Limited.

(*l*) All obligations and liabilities of the Power Company and/or the Transmission Company on contracts for telephone service.

(*m*) Any obligation or liability of the Power Company or of R. C. Board in connection with the mortgage on the house mentioned under letter (*a*) in Schedule "C" to the annexed agreement.

REAL ESTATE

The construction of Chippawa Power Development and other undertakings has rendered it necessary to purchase real estate where affected by the right-of-way. Reports have been prepared on the ownership of real estate and riparian rights at Ranney's Falls and other points. Applications for crown grants and leases have been applied for, covering land at Round Lake and South River.

Real estate affected by right-of-way has been purchased in the following cases:

Purchases

The real estate purchases consist of:—

1. Lands required for the Chippawa to Queenston Power Canal and the construction railway which parallels it and which will, after its construction, be used as an industrial spur.

2. Right-of-way for the duplication of the high tension transmission line from Dundas to Toronto.

3. The Central Ontario system which was purchased from the Electric Power Company and transferred to the Ontario Government by act of parliament.

4. The property of the Ontario Power Company which is located principally in the City of Niagara Falls and the Township of Stamford.

5. Conduit for new power cable at Falls View.

6. University street office site extension.

7. York sub-station site.

8. Extension of Niagara Falls distributing station site.

9. Erindale Power Company at Erindale.

The above-mentioned purchases necessitated the following work:—

(*a*) The filing of deeds and other title papers.

(*b*) Checking descriptions and plans for deeds.

(*c*) Reports on ownership of land at Dams 2 and 5, Trent River, north of the Town of Trenton.

(*d*) Report on ownership of the Waterworks land, Trenton.

(*e*) Report on the Cartwright property, Napanee.

(*f*) Report on ownership, South River Development.

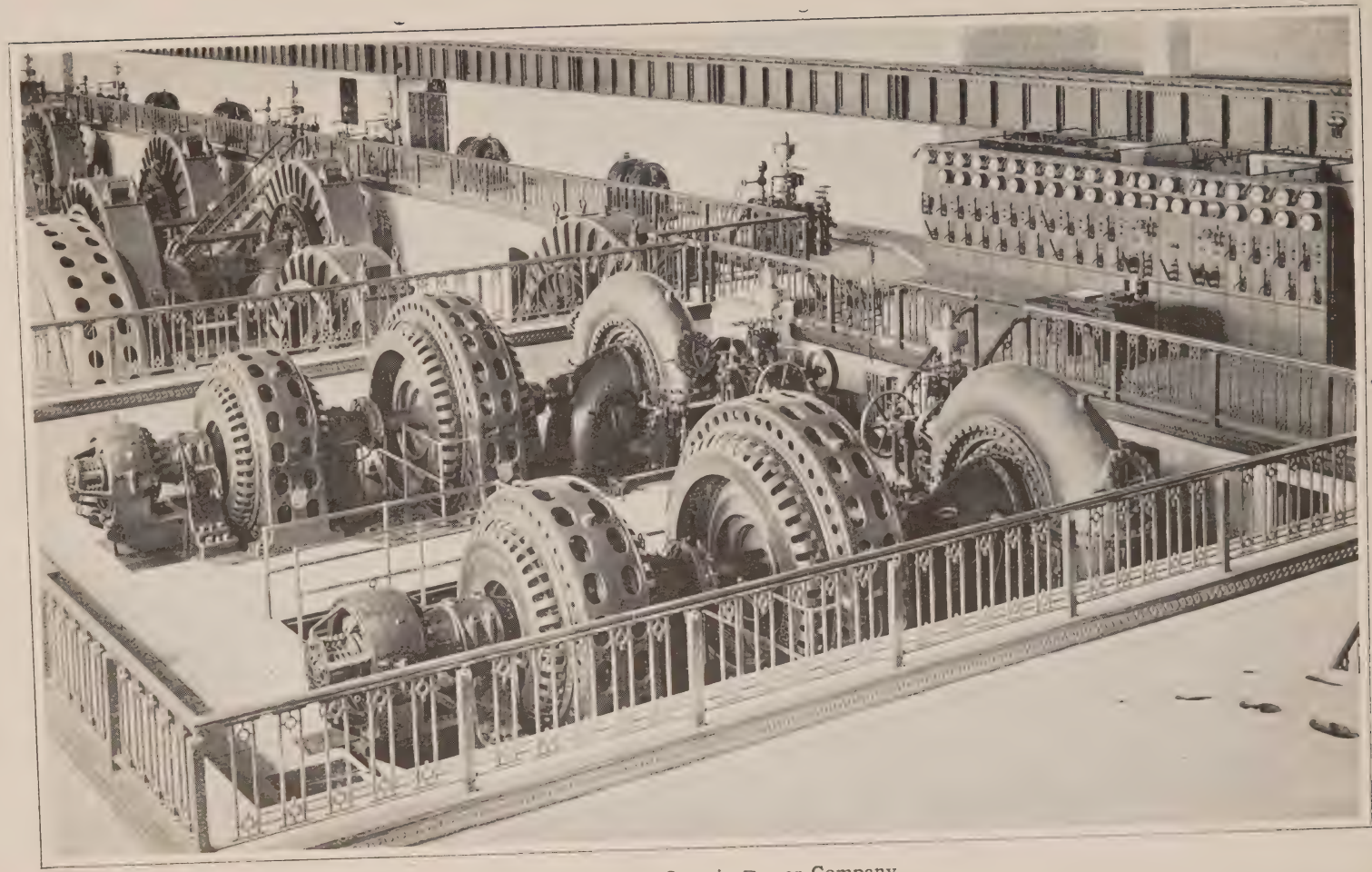
(*g*) Inspection of the Commission's property and boundaries of same.

(*h*) Inspection of new land surveys.

(*i*) Surveys of land, preparation of descriptions and plans in certain cases.

(*j*) Preparation of report for the Tax Commissioner on the Commission's properties.

Plans showing the real estate owned by the Commission in Stamford Township and Niagara Falls are being prepared, and a survey made of conditions governing this land as defined by the title papers.



Exciter Bay, Ontario Power Company

Crossing Designs

During the year several important railway structures were designed for the Niagara Development works, where seven distinct crossings of different railway lines are made by canal and construction railway. Among these were the Niagara, St. Catharines and Toronto Railway arch with span of 86 feet, designed to carry Cooper's E-60 loading, and the G.T.R. (Wabash) arch, with a span of 100 feet, designed for similar loading. Both of these structures are of reinforced concrete and are unique in being the largest of their kind in Canada. A great many negotiations were necessary with the various railways interested, in order to effect temporary diversions of their tracks while permanent structures were being built, and to maintain the uninterrupted operation of their lines.

The permanent structure under the Niagara, St. Catharines and Toronto Railway is now well under construction. Negotiations have also been carried on with the Dominion Department of Public Works, Department of Railways and Canals, and the Queen Victoria Niagara Falls Park Commission, with a view of meeting their requirements in connection with changes to mouth and channel of Chippawa Creek.

Studies have also been made in connection with the replacement of Chippawa Highway swing bridge, and a number of other highway structures, that will be necessary to provide for crossings of the Development Canal.

A number of railway standards in design were prepared and utilized on the construction railway of the Niagara Development work.

SECTION II

TRANSMISSION SYSTEMS

STEEL TOWER TRANSMISSION LINES

DUNDAS—TORONTO

Surveys

During the earlier part of the year a survey party was engaged in taking levels for a profile of the line. This work was completed in December, 1916, and after the profile plans had been finished, the same party commenced staking out towers in the field.

Contracts for Material

Contracts for material were let to the following companies:

To the Canadian Bridge Company of Walkerville, the supply of galvanized steel towers and footings.

To the Canadian Porcelain Company of Hamilton, and the Ohio Brass Company of Akron, Ohio, the supply of insulators.

To the Hadley Company of Chatham, the supply of fence posts and lumber for bridges and culverts.

To the Frost Wire Fence Company of Hamilton, the supply of fence wire and gates.

The remainder of the material, with the exception of copper cable, was supplied from the Commission's stores.

On account of market conditions, it was decided to delay the purchase of power cable until conditions became more favourable.

Organization

The field organization for the year 1917 was similar to that used in 1915 on the Niagara-Dundas line and consisted of tower footing, tower assembly and erection, right-of-way clearing, fence, bridge and insulator erection gangs.

Progress of Construction

The total length of this line is about 35 miles.

Work was commenced on January 5, 1917, and completed on October 29th with the exception of the stringing of power cable, which has not been purchased.

Tower Design and Spacings

Designs used in connection with the new Niagara-Dundas line were followed fairly closely in arranging details and spacings for the Dundas-Toronto section.

Re-stringing of Dundas-Toronto and Kitchener-Stratford Lines

This work was undertaken during the year. The Dundas-Toronto section was originally two circuits of 3/0 aluminum, which have been replaced by two circuits

of 336,000 circ. mil. aluminum, with steel reinforcement, thus adding materially to the carrying capacity and permanence of the section.

This revision has been carried to points near the west bank of the Humber River; east of that point, the only changes to date are the provision of an additional entrance to Toronto Station and the re-location of some towers in the laboratory and storehouse on the Commission's property.

The Kitchener-Stratford section was changed from one circuit of 3/0 aluminum to 7/16" diameter steel, as it is used as a tie line only.

LOW TENSION TRANSMISSION LINES

On October 31, 1917, there were completed and under construction 1,584 miles of low tension transmission lines, of voltages varying from 46,000 to 2,200 volts.

The mileage of these lines is distributed among the various systems as follows:

Niagara System	983.54
St. Lawrence System	66.35
Severn System	117.69
Wasdell's System	65.85
Eugenia System	259 66
Muskoka System	26.32
Central Ontario System	64.94

In the construction of these lines 9,780 miles of wire weighing 6,492,675 pounds and 63,821 wood poles were used.

On the transmission line poles 1,321 miles of single-circuit telephone line has been erected for use in operating the system. During the year an average of 10 gangs were employed, two of which, under the direction of a forestry expert, were employed in trimming trees. These gangs constructed 263 miles of transmission line as well as distribution system in eighteen towns and villages, and rural lines in four townships.

For the above lines 108 crossing plans were prepared and submitted to telephone and railway companies for approval.

Local distribution systems were constructed by the Commission in the towns and villages of: Horning's Mills, Elmwood, Bothwell, Long Branch, Lambton, Islington, Napanee, Midland (extension), Hanover, Chesley, Victoria Harbour, Arthur, Orangeville, Grand Valley, Shelburne, Tara, Dublin and rural lines in the townships of Toronto, Etobicoke, Vaughan and Scarboro.

Although handicapped by scarcity of labor and the difficulty of obtaining material some important lines were successfully constructed in good time to the great satisfaction of the communities benefited thereby.

Description

NIAGARA

Sec. No.	From	To	Length of Pole	Span	Miles	No. of Poles
L.T.			feet	feet		
1	Dundas Sub. H.E.P.C....	Junction Pole No. 134....	40	120	2.84	134
2	Junction Pole No. 134....	Beach Pump House.....	40	120	6.34	323
3	" " No. 134....	Asylum	50	120	1.13	67
4	Berlin Sub. H.E.P.C....	Junction Pole No. 10	40	.....	.18	10
5	Junction Pole No. 10.....	Waterloo	40	120	1.64	78
6	" " No. 10.....	Berlin Corp. Station.....	45	120	.76	35
7	Berlin Sub. H.E.P.C.....	New Hamburg.....	40	120	12.27	556
8	Woodstock "	Ingersoll	40	120	9.90	455
9	" "	Junction Pole No. 508....	40	120	11.12	508
10	Junction Pole No. 508....	Tillsonburg.....	40	120	10.30	467
11	" " No. 508....	Norwich.....	40	120	4.59	207
12	St. Thomas Sub. H.E.P.C.	St. Thomas Corp. Station	40& 45	120	1.13	50
13	Stratford " "	Stratford "	40& 45	120	1.75	78
14	Preston " "	Junction Pole No. 99.....	45	120	2.04	99
15	Junction Pole No. 99....	Hespeler.....	40	120	2.08	99
16	" " No. 99....	Galt.....	40	120	3.75	173
17	Preston Sub. H.E.P.C....	Preston Corp. Station....	35	120	.14	11
			These poles also carry Section L.T. 35			
18	London Sub.....	Junction Pole No. 38.....	40	120	.79	38
19	Junction Pole No. 38.....	Asylum, London	45	120	1.54	70
20	" " No. 38.....	Junction Pole No. 93.....	40	120	1.22	55
21	London Sub. H.E.P.C....	London Sub. No. 1.....	40	120	3.56	178
22	Junction Pole No. 93.....	" " No. 1.....	40	120	1.71	96
23	" " No. 93.....	" " No. 2.....	40	120	.31	20
24	London Sub. No. 1.....	Springbank	40	120	3.55	156
25	Dundas Sub. H.E.P.C....	Dundas Town.....	40& 45	120	.98	58
26	Cooksville Sub. H.E.P.C.	Port Credit L.S. Road ...	40	120	2.74	129
26a	Pt. Credit L.S. Road....	Port Credit Brick Works	45	120	.24	14
27	Cooksville Sub. H.E.P.C.	Brampton	40	120	11.24	510
			These poles also carry Section L.T. 34 Circuits			
28	Junction Pole No. 1547...	Clinton.....	40	120	1.27	78
29	" " No. 1152...	Seaforth.....	40	120	1.50	74
30	" " No. 648....	Mitchell.....	40	120	1.27	63
31	Guelph Sub. H.E.P.C.....	O. A. College.....	40	120	1.56	77
32	" H.E.P.C. Sub. Property.....	.....	40	120	.09	8
					18 poles on Station	
34	Cooksville Sub. H.E,P.C..	Weston.....	40	120	14.07	551
					These Circuits carried on	
35	Preston Sub. H.E.P.C....	G. P. & H. Ry.....	40	120	.12	6
					These Circuits carried on	
36	Junction Pole No. 84, Port Credit.....	Mimico (New Toronto).	45	120	5.75	266
38	Dundas Sub. H.E.P.C....	Dom. Sewer Pipe Works.	40	120	7.35	350
39	Hamilton Asylum P.H...	Hamilton Asylum.....	35	120	.63	30
40	Junction Pole No. 260....	Waterdown	35	120	1.50	72
40a	Dom. Sewer Pipe Works.	Junction Pole No. 260....	.....	.....	1.92	.....
41	St. Thomas Sub. H.E.P.C.	Port Stanley.....	35	120	12.27	573
42	Junction Pole, No. 290, L.T. 8	Standard White Lime Co.	.....	.....	1.00	2
					These circuits carried on Section	
43	Dundas Sub. H.E.P.C....	Jno. Bertram & Son.....	40	120	1.21	10
					These Circuits carried on Section	
44	Baden Sub.....	Wellesley	30	150	7.92	316
45	Junct. Pole No. 240 L.T. 8	Beachville	40	120	.09	3
46	St. Mary's Sub.....	St. Mary's Cement Works	40	120	2.22	80

of Lines.

SYSTEM.

Voltage	No. of Circuits	Power Cables B. & S. Gauge	Telephone Wires, B.&S & B.W.G. Gauge	Ground Wire	Work Commenced	Work Completed	In Operation
13,200	2	No. 1/0 Alum	10 Copper	1/4" Gal. Steel	July 13, 1910	Jan. 2, 1911	
"	2	1/0 "	10 "	1/4" "	July 13, "	Jan. 2, "	
"	1	2 "	10 "	1/4" "	Dec. 5, "	Feb. 8, "	
"	2	1/0 "	10 "	1/4" "	Aug. 25, "	Sept.11, 1910	
"	2	1/0 "	10 "	1/4" "	Sept.11, "	Nov. 25, "	
"	2	1/0 "	10 "	1/4" "	Aug. 25, "	Sept.11, "	
"	2	2 "	10 "	1/4" "	Sept. 11. "	Jan. 2, 1911	Feb. 3, 1911
"	2	1/0 "	10 "	1/4" "	Nov. 14, "	Mar. 28, "	
"	2	1/0 "	10 "	1/4" "	Jan. 2, 1911	Apr. 29, "	
"	2	1/0 "	10 "	1/4" "	Jan. 2, "	Apr. 29, "	
"	1	2 "	10 "	1/4" "	Feb. 13, "	Mar. 30 "	
"	2	1/0 "	10 "	1/4" "	Dec. 14, 1910	Dec. 30, 1910	
"	1	2 Copper	10 "	1/4" "	Built by Corporation		
6,600	3	1-2Alum 2-4/0 "	10 "	1/4" "	Oct. 8, 1910	Jan. 19, 1911	
"	1	2 Alum	10 "	1/4" "	Oct. 8, "	Dec. 30, 1910	
"	2	4/0 "	10 "	1/4" "	Oct. 8, "	Jan. 19, 1911	
"	1	2 Copper	10 "	1/4" "	Built by Corporation.		
circuits to G. P. H. Railway Sub.							
13,200	2	1-3/0 Alum 1-2 "	10 Copper	1/4" "	Oct. 26, 1910	Jan. 10, 1911	
"	1	2 "	10 "	1/4" "	Oct. 26, "	Jan. 19. "	
"	1	3/0 "	10 "	1/4" "	Oct. 24, "	Jan. 21, "	
"	1	3/0 "	10 "	1/4" "	Oct. 20, "	Jan. 20, "	
"	2	1-3/0 " 1-1/0 "	10 "	1/4" "	Dec. 23, "	Jan. 20, "	
"	1	1/0 "	10 "	1/4" "	Dec. 23, "	Jan. 20, "	
"	1	1/0 "	10 "	1/4" "	Jan. 1, 1911	Jan. 7, "	
2,200	1	400,000c.m. Alum 250,000c.m. Copper	.....		Dec. 1, 1910	Jan. 1, "	
13,200	2	2 Alum	10 Copper	1/4" Gal. Steel	Feb. 24, 1911	July 10, "	
"	2	2 "	10 "	1/4" "	Apr. 5, "	July 23 "	
"	2	2 "	10 "	1/4" "	Feb. 15, "	May 6, "	
from poles No. 1 to 89—1.94 miles							
26,400	2	3/0 Alum	10 Copper	1/4" "	Apr. 6, "	Aug. 4, "	
"	2	2 Alum	10 "	1/4" "	Mar. 25, "	Sept.13, "	
"	2	2 "	10 "	1/4" "	Mar. 24, "	Aug. 3, "	
13,200	1	1/0 "	10 "	1/4" "	July 21, "	Nov. 9, "	
550d.c.	1	Municipal lines					
2,200a.c.	4						
13,200a.c.	3	1/0 Alum	10 Copper	1/4" "	Aug. 7, 1911	Sept. 3, 1911	Sept. 4, 1911
Property in all.							
13,200	2	2 Alum	8 Copper	1/4" "	Apr. 19. "	July 24, "	
Section L.T. 27 poles, 1 to 89, inclusive							
6,600	1	1/0 Alum	10 Copper	1/4" "	Mar. 13, "	Mar. 21, "	
Section L.T, 17 poles, 1 to 11, inclusive							
13,200	2	1-2 S.R.Alum 1-2 Alum	8 Copper	1/4" "	Apr. 26, "	Feb. 29, 1912	
"	1	2 "	8 "	1/4" "	July 21, "	Dec. 19, 1911	Apr. 6,1912
2,200	2	4 Copper	10 "	.....	Sept. 6, "	Oct, 27, "	Apr. 6 "
13,200	1	2 Alum	8 "	1/4" Gal.Steel	Sept. 30, "	Oct. 10, "	Apr. 6 "
"	1	2 "	8 "	1/4" "	Sept. 30, "	Oct. 7, "	Mar. 1 "
"	1	2 "	8 "	1/4" "	Oct. 16, "	Mar. 8, 1912	Mar. 9 "
2,200	1	2 "	.....	.....	.....	.....	.....
L.T. 8 poles, from Beachville pole 290 to pole 240.							
13,200	1	2 Alum	10 Copper	1/4" Gal.Steel	Dec. 1, 1911	Dec. 19, 1911	Dec. 21,1911
L.T. 25 poles, 1 to 58 inclusive.—.98 miles							
4,000	1	4 Copper	.....	6 B.W.G.Iron	May 16, 1916	Aug.11, 1916	Oct. 23,1916
13,200	1	1/0 Alum	8 Copper	1/4" Gal. Steel	June 1, 1912	June 29, 1912	July 17,1912
"	1	3/0 "	8 "	1/4" "	July 15, "	Aug. 19, "	Sept. 7, "

Description of

NIAGARA

Sec. No.	From	To	Length of Pole	Span	Miles	No. of Poles
			feet	feet		
47	Dundas Sub	Caledonia	40	120	14.36	674
47a	Caledonia	Paris Alabastine Co			.22	
					These Circuits carried on	
48	Caledonia	Junction Pole No. 940	40	120	5.87	267
49	Junction Pole No. 940	Hagersville	40	120	3.79	176
50	" No. 940	Lythmore	40	120	4.98	230
55	St. Thomas Sub. H.E.P.C.	L.L.E. Ry. Sub	40	120	1.68	88
56	Port Credit	Toronto Golf Club	30	120	3.24	11
56a	Extension from Sect. L.T. 56 on T.G.C. property				Carried on Section .90	37
57	O. A. College	Guelph Prison Farm. Pole 156	40	120	1.93	86
57a	Guelph Prison Farm	Property	40	120	.08	4
58	Guelph Prison Farm, Pole 156	Junction Pole No. 454	40	120	6.42	297
59	Junction Pole No. 454	Acton	40	120	5.82	268
60	St. Catharines	Port Dalhousie	30	120	3.18	142
61	Caledonia Sub	Caledonia			.30	
					Carried on	
62	Junction Pole No. 230 L.T. 27	Milton	40	120	16.65	740
63	Preston Sub	Doon Twine Mill	35	120	4.18	208
					Carried on Section	
64	Mimico Sub	Mimico Asylum			1.51	17
					Carried on Section	
65	Acton	Georgetown	40	120	9.03	411
66	Junction Pole No. 454	Rockwood	35	120	1.64	77
68	Brant Station	Paris	40	120	3.21	152
69	" "	Brantford	40	120	6.66	320
71	Waterloo	Elmira	40	120	10.93	518
72	Preston	Breslau	40	120	6.48	293
73	Niagara Falls	Junction Pole 113	48	250	5.00	113
74	Junction Pole 113	Union Carbide Co	48	250	10.50	235
75	" 303	Electric Steel & Metal Co	48	250	1.93	45
76	Junction Pole No. 38, L.T. 18	Crumlin Junction	35	132	5.31	218
77	Crumlin Junction	Thorndale	35	132	7.91	310
78	" "	Thamesford	35	132	6.85	281
79	Jct. Pole No. 381 L.T. 62	Streetsville	45	120	.43	19
81	Essex Station	Jct. Pole No. 55	45	120	1.10	55
82	Jct. Pole No. 55	Windsor	45	120	2.27	102
83	Jct. Pole No. 55	Walkerville	40	120	1.30	61
84	Kent Station	Chatham	40	132	1.93	99
85	Jct. Pole No. 118 L.T 57	Jct. Pole No. 776, L.T. 85	40	120	14.61	658
86	" " 776 " 85.	Elora	40	120	1.18	58
87	" " 776 " 85.	Fergus	35	120	1.96	94
88	Paris	Junction Pole No. 313	35–40	132	7.41	312
89	Jct. Pole No. 313 L.T. 88	Ayr	40	120	1.20	58
90	Jct. Pole No. 313 L.T. 88	Drumbo	35	132	6.83	284
91	Drumbo	Princeton	35	132	5.65	233
92	Drumbo	Plattsville	35	132	7.35	299
					1.00 miles carried	
93	Jct. Pole No. 388 L.T. 77	Deller Bros	30	132	.89	48
94	Jct. Pole No. 1005 L.T. 65	I. P. B. Co	35	132	5.08	221
95	London	Lambeth (Pole No. 462)	40	120	10.15	463
96	Lambeth (Pole No. 462)	Komoka Jct. (Pole No. 759)	40	120	6.58	298
97	Komoka Jct. (Pole No. 759)	Mt. Brydges (Pole No. 943)	40	120	4.00	184
98	Mt. Brydges (Pole No. 943)	Strathroy (Pole No. 1,368)	40	120	9.27	424
99	London	Lucan	35–40	132	19.18	783
99c	London	Lucan			21.51	
					These circuits carried	
100	Niagara Falls	Elec. Devel. Co.	45	100	1.25	52

Lines—Continued

SYSTEM

Voltage	No. of Circuits	Power Cables B. & S. Gauge	Telephone Wires, B. & S. & B. W. G. Gauge	Ground Wire.	Work Commenced	Work Completed	In Operation
13,200	1	3/0 Alum	8 Copper.	¼" Gal. Steel	May 10, 1912	Sept. 18, 1912	Sep. 20, 1912
2,200	1	2/0 Copper	.....	.....	Sept. 5, "	Sept. 18, "	" 20, "
Section L.T. 49 poles.							
13,200	1	3/0 Alum	8 Copper	¼" Gal. Steel	June 22, "	Sept. 18, "	Sep. 20 "
"	1	2 "	10 "	¼" "	Feb. 28, 1913	May 2, 1913	Aug. 15, 1913
"	1	3/0 "	8 "	¼" "	June 15, 1912	Sept. 18, 1912	Sep. 20 "
"	1	2 "	8 "	¼" "	Aug. 9, "	Oct. 11, "	Oct. 27, 1912
2,200	1	6 D.B.W.P. Copper	.....	.....	June 10, "	Aug. 3, "	Aug. 6 "
L.T. 36 poles							
2,200	1	6 "	.....	.....	Nov. 22, "	Jan. 3, 1913	Dec. 24 "
13,200	1	2 Alum	8 Copper	¼" Gal. Steel	Aug. 19, "	Dec. 14, 1912	Dec. 14 "
"	1	2 "	10 "	¼" "	May 14, 1913	May 19, 1913	Sep. 4 "
"	1	2 "	8 "	¼" "	Aug. 19, 1912	Dec. 14, 1912	Dec. 14, 1912
"	1	2 "	8 "	¼" "	" 19, 1912	Dec. 14, 1912	Dec. 14 "
2,200	1	1/0 "	.....	.....	Oct. 16, 1912	Nov. 21, "	Nov. 17 "
"	1	4 D.B.W.P. Copper	.....	.....	Nov. 20, 1912	Nov. 30, "	Nov. 30 "
Section L.T. 47 poles.							
13,200	1	3/0 Alum	10	¼" Gal. Steel	Nov. 25, 1912	Mar. 13, 1913	Mar. 13, 1913
6,600	1	2 "	.....	.....	Dec. 2, 1912	Apl. 11, "	Apl. 1 "
L.T. 17 poles, No. 1 to 11, inclusive. L.T. 35 from 11 to 17 inclusive.					Mar. 30, 1912	Feb. 3, "	Apl. 26 "
2,200	1	2 Copper	.....	.....			
L.T., 36 poles							
13,200	1	3/0 Alum	10 Copper	¼" Gal. Steel	Mar. 11, 1913	Aug. 1, "	Aug. 1 "
"	1	2 "	10 "	¼" "	May 6, 1913	July 3, "	Aug. 1 "
26,400	2	3/0 Alum	10 "	¼" "	Nov. 11, 1913	Jan. 2, 1914	Jan. 3, 1914
26,400	2	3/0 "	10 "	¼" "	Dec. 15, 1913	Jan. 17, "	Jan. 17 "
13,200	1	2 "	10 "	¼" "	May 17, 1913	Oct. 14, 1913	Oct. 25, 1913
6,600	1	2 "	10 "	¼" "	Apr. 4, 1913	Dec. 23, 1913	Dec. 23, 1913
46,000	3	4/0 Copper	8 "	¼" "	Mar. 15, 1914	Steel Towers.	Aug. 20, 1914
46,000	3	4/0 "	8 "	¼" "	Mar. 15, 1914		Aug. 20, 1914
				¼" "			Oct. 17, 1914
46,000	1	2/0 "	8 "	¼" "	July 11, 1914		
13,200	1	2 Alum	.....	¼" "	Sept. 18, 1913	May 8, 1914	Jan. 27, 1914
"	1	2 "	.....	¼" "	Oct. 10, 1913	Feb. 6, 1914	Feb. 6 "
"	1	2 "	.....	¼" "	Oct. 13, 1913	Jan. 19, "	Jan. 27 "
"	1	2 "	10 Copper	¼" "	Nov. 1, 1913	Nov. 24, 1913	Nov. 24, 1913
26,400	4	3/0 "	10 "	¼" "	July 28, 1914	Sept. 6, 1914	Sep. 6, 1914
"	2	3/0 "	10 "	¼" "	July 31, 1914	Sept. 18, 1914	Sep. 18 "
"	2	3/0 "	10 "	¼" "	June 2, 1914	Aug. 1, 1914	Sep. 6 "
"	2	2/0 "	10 "	¼" "	Oct. 21, 1914	Feb. 22, 1915	Feb 1, 1915
13,200	1	3/0 "	10 "	¼" "	June 3, 1914	Oct. 17, 1914	Oct. 22, 1914
"	1	3/0 "	10 "	¼" "	Aug. 18, 1914	Oct. 28, 1914	Oct. 22 "
"	1	3/0 "	10 "	¼" "	Aug. 1, 1914	Oct. 13, 1914	Oct. 22 "
26,400	1	1/0 "	10 "	¼" "	July 21, 1914	Nov. 30, 1914	Dec. 1 "
"	1	1/0 "	10 "	¼" "	Sept. 15, 1914	Nov. 30, 1914	Dec. 1 "
"	1	1/0 "	10 "	¼" "	July 13, 1914	Nov. 30, 1914	Dec. 1 "
4,000	1	6 Copper	.....	¼" "	Aug. 17, 1914	Nov. 30, 1914	Dec. 18 "
"	1	4 "	.....	¼" "	Aug. 17, 1914	Nov. 30, 1914	Dec. 1 "
on L.T. 90	Poles						
4,000	1	6 "	.....	¼" "	Mar. 19, 1914	Mar. 19, 1915	Mar. 19, 1915
13,200	1	1/0 Alum	10 Copper	¼" "	June 10, 1914	June 31, 1914	July 3, 1914
"	1	3/0 "	10 "	¼" "	Sept. 1, 1914	Nov. 30, 1914	Nov. 30 "
"	1	3/0 "	10 "	¼" "	Oct. 15, 1914	Nov. 30, 1914	Nov. 30 "
"	1	3/0 "	10 "	¼" "	Sept. 29, 1914	Nov. 30, 1914	Nov. 30 "
"	1	3/0 "	10 "	¼" "	Sept. 14, 1914	Nov. 30, 1914	Nov. 30 "
"	1	2 S.R. "	10 BWG Iron	¼" "	Oct. 23, 1914	Jan. 20, 1915	Jan. 21, 1915
"	1	2 S.R. "	.....	.....	July 3, 1916	Dec. 7, 1916	Dec. 7 1916
on L.T. 18 poles 1 to 38, L.T. 19 poles 38 to 100 and L.T. 99.							
12,000	2	4/0 Copper	9 BWG Iron	¼" Gal. Steel	Oct. 27, 1915	Oct. 31, 1915	Oct. 31 1915

Description of

NIAGARA

Sec. No.	From	To	Length of Pole.	Span.	Miles	No. of Poles
			feet	feet		
101	Kent Sta. Pole No. 40....	Tilbury.....	30	132	16.91	85
					15.00 miles carried	
102	Kent Station.....	Junction No. 68	40	120	1.48	68
102a	"	Junction No. 68	.....	.....	1.48	.....
102b	"	Junction Pole No. 68....	.....	.....	1.48	.....
103	Junction Pole 68, L.T. 102	Junction Pole No. 519....	40	120	9.98	451
103a	" " 68 L.T. 102	Junction Pole No. 519....	.....	.....	9.98	.....
104	" " 519 L.T. 103	Wallaceburg	40	120	8.50	386
105	" " 519 L.T. 103	Dresden.....	40	120	7.40	309
106	" " 289 L.T. 8	Embro.....	35	132	6.10	254
107	" " 564 L.T. 34	Woodbridge.....	35	132	6.44	277
108	Woodbridge	Bolton.....	35–40	132	13.03	540
109	Junction Pole	W. T. & I.Ry.....	.....	.....	.02	2
110	Mimico Sub-Station	Prison Brick Yard.....	30	125	.71	32
111	Brant Sub-Station	Junction Pole 249.....	35–40	132	5.84	249
112	Junction Pole 249 L.T. 111	Burford.....	35	132	3.48	142
113	" " 249 L.T. 111	Waterford	35–40	132	14.20	616
114	Waterford.....	Simcoe	35	132	8.90	366
115	Tilbury	Comber.....	30	132	7.26	306
116	Delaware Sub-Station ...	Lambeth	40	120	6.58	.....
					Carried on	
117	" Junc. Pole 759,.	Mount Brydges	40	120	4.00	.....
					Carried on	
118	Bertram's Sub-Station, Pole No. 69-L.T. 43....	Dundas	55	.....	.37	21
119	Junction Pole 759L. T. 96	Delaware Sub-Station ...	55	120	.09	5
					Lambeth & Mt. Brydges	
121	St. Thomas.....	Dutton	30	132	18.50	756
122	Ridgetown.....	Highgate	.....	.....	6.18	9
					These circuits carried on	
123	Junction Pole 68 L.T. 102	Thamesville	35	132	14.60	683
124	Junction Pole 676 L.T. 123	Bothwell	35	132	9.83	410
125	Stratford.....	Tavistock	35	132	9.72	398
126	Junction Pole 68 L.T. 102	Blenheim	35	132	9.52	390
127	Junction Pole 469 L.T. 123	Ridgetown.....	35	132	8.02	333
128	Brant	St. George	30	132	9.09	369
					4.50 miles carried	
129	Dundas	Lynden.....	35	132	12.75	430
130	Lucan.....	Ailsa Craig	30	132	10.14	410
131	Dresden	Petrolia	35–40	125	21.78	947
132	Petrolia	Wyoming Jct. Pole 1963 .	40	125	4.85	220
133	Wyoming Jct. Pole 1963 ..	Perch Jct. Pole 2305.....	35	125	7.92	343
134	Lucan.....	Granton	30	132	6.95	246
135	Perch Jct. Pole 2305.....	Sarnia.....	35	125	7.73	332
136	Lucan.....	Exeter.....	35	132	13.24	552
137	Petrolia	Wyoming	25	132	e 7.50	e 25
138	Sebringville Junction Pole 311 L.T. 146	Milverton Jct. Pole 802..	35	132	11.90	491
139	Milverton Jct. Pole 802..	Milverton	35	132	.96	40
140	" " 802..	Listowel Jct. Pole 1313 ..	35	132	12.65	512
141	Listowel Jct. Pole 1313..	Listowel	35	132	2.77	122
142	" " 1313..	Palmerston	35	132	10.48	431
143	Palmerston	Harriston	35	132	6.11	259
145	Wyoming Jct. Pole 1963.	Forest.....	35–40	132	20.10	817
146	Stratford Sub	Jt. Pole311 (Sebringville)	40	120	6.81	311
147	Jct. Pole 311 (Sebringville)	Jct. Pole 648 (Mitchell)..	40	120	7.61	337
148	Jct. Pole 648 (Mitchell)..	Jct. Pole 1152 (Seaforth).	40	120	11.36	505
149	Jct. Pole 1152 (Seaforth)	Jct. Pole 1547 (Clinton)..	40	120	8.84	395
150	Jct. Pole 1547 (Clinton)..	Goderich	40	120	13.61	612
151	Exeter	Hensall	30	132	6.19	259
152	Niagara Falls Sub	Ont. Power Co. Line.....	40	125	.31	17

Lines—Continued

SYSTEM

Voltage.	No. of Circuits	Power Cables B. & S. Gauge	Telephone Wires, B. & S. & B.W.G. Gauge	Ground Wire	Work Commenced	Work Completed	In Operation
26,400	1	2 S.R. Alum	10 BWG Iron	¼" Gal. Steel	Jan. 13, 1915	May 12, 1915	Mar. 3, 1915
on H.T. Telephone Poles							
26,400	1	1/0 "	10 "	¼" "	Oct. 28, 1914	Feb. 3, "	Feb. 3, "
"	1	3/0 "	.....	.....	June 22, 1915	June 29, "	June 29 "
"	1	3/0 "	.....	.....	Oct. 7, "	Oct. 13, "	Oct. 13 "
"	1	1/0 "	10 BWG Iron	¼" Gal. Steel	Oct. 30, 1914	Feb. 3, "	Feb. 3 "
"	2	3/0 "	.....	.....	Oct. 12, 1915	Mar. 15, 1916	Mar. 15, 1916
"	1	1/0 "	10 BWG Iron	¼" Gal. Steel	Nov. 6, 1914	Feb. 3, 1915	Feb. 3 1915
"	2	3/0 "	10 "	¼" "	Nov. 3, "	May 1, "	Mar. 30 "
13,200	1	1/0 "	10 "	¼" "	Oct. 1, "	Dec. 24, 1914	Dec. 22, 1914
"	1	1/0 "	10 "	¼" "	Sept. 25, "	Oct. 21, "	Dec. 2 "
"	1	1/0 "	10 "	¼" "	Oct. 20, "	Nov. 26, "	Jan. 26, 1915
"	1	2 "	10 "	.....	Sep. 12, "	Sep. 12, "	Sep. 13, 1914
2,200	1	2/0 Copper	.....	.....	Oct. 24, "	Feb. 17, 1915	Feb. 17, 1915
26,400	1	2 S.R. Alum	10 BWG Iron	¼" Gal. Steel	Nov. 6, "	May 4, "	May 6 "
"	1	2 S.R. "	10 "	¼" "	Nov. 21, "	May 28, "	May 6 "
"	1	2 S.R. "	10 "	¼" "	Nov. 21, "	May 5, "	May 10 "
"	1	2 S.R. "	10 "	¼" "	Nov. 26, "	May 7, "	May 9 "
"	1	2 S.R. "	10 "	¼" "	Jan. 14, 1915	May 8, "	Apr. 20 "
4,000	1	1/0 Copper	.....	¼" "	Jan. 25, "	Mar. 12, "	Mar. 15 "
"	1	6 Copper	.....	¼" "			
L.T. 96 poles							
4,000	1	6 M.H.D.	.....	¼" "	Jan. 7, "	Jan. 23, "	Mar. 1 "
L.T. 97 poles							
13,200	1	1/0 Alum	10 BWG Iron	¼" "	Feb. 25. "	Mar. 15, "	Mar. 15 "
"	1	3/0 "	10 "	¼" "	Jan. 27, "	Mar. 9, "	Feb. 1 "
4,000 v. circuit carried on L.T. 119 poles							
13,200	1	1/0 Alum	.....	¼" "	May 3, "	Aug. 21, "	Aug. 27 "
4,000	1	6 B.W.G. Iron	.....	6 B.W.G. Iron	Oct. 3, 1916	Nov. 4, 1916	Nov. 6, 1916
H.T. relay poles.							
26,400	1	1/0 Alum	9 BWG. Iron	¼" Gal. Steel	May 18, 1915	July 14, 1915	Sep. 14, 1915
"	1	2 S.R. "	9 "	¼" "	June 26, "	Aug. 17, "	Aug. 17 "
"	1	6 B.W.G. Iron	9 "	6 B.W.G. Iron	Sept. 9, "	Sep. 5, 1916	Oct. 26, 1916
"	1	2 S. R. Alum	9 "	¼" Gal. Steel	July 2, "	Oct. 7, 1915	Oct. 20, 1915
"	1	2 "	9 "	¼" "	June 24, "	Sep. 7, "	Nov. 24 "
"	1	2 "	9 "	¼" "	July 1, "	Aug. 17, "	Aug. 17 "
4,000	1						
on H.T. Tel. and Relay line							
13,200	1	2 S.R. Alum	9 BWG. Iron	¼" "	July 24, "	Oct. 15, "	Oct. 22 "
4,000	1	2 S.R. "	.....	¼" "	July 28, "	Dec. 11, "	Dec. 15 "
26,400	2	3/0 "	9 BWG Iron	¼" "	Aug. 30, "	Feb. 18, 1916	Apl. 6, 1916
"	2	3/0 "	9 "	¼" "	Mar. 1, 1916	Sep. 12, "	Nov. 10 "
"	2	3/0 "	9 "	¼" "	Apl. 6, "	Sep. 29, "	Nov. 10 "
4,000	1	6 Copper	.....	6 B.W.G. Iron	Apl. 6, "	May 27, "	June 29 "
26,400	2	3/0 Alum	9 B.W.G. Iron	¼" Gal. Steel	May 9, "	Nov. 4, "	Nov. 10 "
13,200	1	3/0 "	9 "	¼" "	Nov. 26, 1915	May 4, "	May 4 "
4,000	1	6 Copper	9 "	.....	Sept. 1, "	Oct. 4, "	Oct. 4 "
26,400	1	1/0 S.R. Alum	9 BWG. Iron	¼" Gal. Steel	Sept. 20, "	May 15, "	May 18 "
"	1	2 "	9 "	¼" "	Oct. 15, "	May 18, "	May 18 "
"	1	1/0 "	9 "	¼" "	Oct. 13, "	May 22, "	May 27 "
"	1	2 "	9 "	¼" "	Oct. 28, "	May 22, "	May 27 "
"	1	1/0 "	9 "	¼" "	Oct. 14 "	June 6, "	June 6 "
"	1	1/0 "	9 "	¼" "	Dec. 10, "	June 30, "	June 30 "
"	1	1/0 "	9 "	¼" "	June 26, "	Dec. 4, "	Feb. 7, 1917
"	1	6 B.W.G Iron	9 "	¼" "	Apl. 23, 1913	June 4, 1914	Dec. 23, 1914
"	2	3/0 Alum	10 Copper	¼" "	Apl. 23, "	June 4, "	Dec. 23 "
"	2	3/0 "	10 "	¼" "	Apl. 23, "	June 4, "	Dec. 23 "
"	2	3/0 "	10 "	¼" "	Apl. 23, "	June 4, "	Dec. 23 "
"	2	3/0 "	10 "	¼" "	Apl. 23, "	June 4, "	Dec. 23 "
"	2	3/0 "	10 "	¼" "	Apl. 23, "	June 4, "	Dec. 23 "
4,000	1	6 Copper	.....	6 B.W.G. Iron	Sept. 11, 1916	Dec. 21, 1916	Dec. 21, 1916
12,000	2	2/0 "	.....	.....	Oct. 24, "	Nov. 1, 1916	Nov. 5, 1916

Description of

NIAGARA

Sec. No.	From	To		Length of Pole	Span	Miles	No. of Poles
				feet	feet		
153	Dutton	West Lorne Sub-Station..		30	132	7.62	312
					This circuit carried		
154	West Lorne Sub-Station .	Rodney		30	132	4.00	161
					This circuit carried		
155	Etobicoke Sub-Station...	New Toronto Sub-Station		45	125	2.78	126
157	Wanstead Jct. Pole 2336 L.T. 145	Watford		35	132	10.82	442
158	Junction Pole L.T. 67	Dublin		30	150	1.26	47
159	Exeter Sub-Station	Sarepta Jct. 319		30	132	7.58	319
					This circuit carried		
160	Sarepta Jct. 319	Dashwood		30	132	1.35	55
161	Sarepta Jct. 319	Zurich		30	132	5.15	211
163	Cooksville Sub-Station...	Ont. Nat. Brick Co.		55	120	1.07	89
					This circuit carried		
164	Welland	Dunnville	E	35	176	22.50	648
165	Essex Sub-Station	Sandwich Salt Co.		40	132	8 10	351
172	Jct. Pole 1445 L.T. 131...	Oil Springs		35	132	1.42	65
173	Jct. Pole 1445 L.T. 131...	Brigden		35	132	8.88	364
174	St. Thomas Sub-Station, Jct. Pole 107 L.T. 141..	Aylmer		35	132	9.60	406
178	Palmerston	Drayton	E	30	150	11.00	396
179	Erindale Power House...	Cooksville Sub-Station...		35	132	3.11	128

SEVERN

S.L.							
1	Waubaushene	Jct. Pole 193 (Coldwater).		40	120	4.29	193
2	Jct. Pole 193 (Coldwater).	Coldwater		40	120	1.16	55
3	" " 193 "	Jct. Pole 903 (Elmvale)..		40	120	15.86	710
4	" " 903 (Elmvale) ..	Elmvale		40	120	.42	19
5	" " 903 " ..	Jct. Pole 1110 (Phelpston)		40	120	4.55	207
6	" " 1110 (Phelpston).	Barrie		40	120	12.27	550
7	" " 1110 " .	Jct. Pole 1785 (Stayner)..		40	120	15.07	675
8	" " 1785 (Stayner)...	Stayner		40	120	1.50	68
9	" " 1785 " ..	Collingwood		40	120	11.86	530
10	Stayner	Creemore		35	120	7.67	348
12a	Waubaushene Pole 540 ...	Victoria Harbor Jct. 730.		35	100	3.59	190
14a	Victoria Harbor Jct. 730 .	Port McNicholl Jct. 969..		35	100	4.02	213
15	Port McNicholl Jct. 969 .	Port McNicholl		35	120	.50	35
17	Midland	Penetang		40	120	4.69	223
20	Port McNicholl Jct. 943 .	C.P.R. Elevators		35	125	1.34	58
21	Jct. Pole 1590 S.L 6	Camp Borden		35	132	14.34	604
24	Barrie Sub-Station	Jct. Pole 1 (Painswick Tap)	E	40	125	4.00	173
25	Jct. Pole 1 (Painswick Tap)	" " 2 (Thornton Tap)	E	40	125	4.50	194
26	" " 2 (Thornton Tap)	" " 3	E	40	125	6.25	273

ST. LAWRENCE

ST.L.							
1	Morrisburg	Prescott		40	120	22.96	1,083
2	"	Winchester		40	120	16.29	747
3	Winchester	Chesterville		40	120	6.52	294
5	Prescott	Brockville		40	120	14.08	639
6	Morrisburg	North Williamsburg				6.50	
This circuit carried on St. L. 2 poles							

E—Estimated.

Lines.—Continued.

SYSTEM

Voltage	No. of Circuits	Power Cables B.&S. Gauge	Telephone Wires, B.&S. & B.W.G. Gauge	Ground Wire	Work Commenced	Work Completed	In Operation
13,200	1	6 BWG Iron	.....	Dec. 4, 1916	Jan. 19, 1917	Dec. 22, 1916	
on H.T. Telephone and Relay Poles.							
4,000	1	6 MHD Copper	6 BWG Iron	Jan. 2, 1917	Jan. 17, "	Jan. 15, 1917	
on H.T. Telephone and Relay Poles.							
.....	.....	.....	.....	¼" Steel	Feb. 9, "	.....	.....
26,400	1	6 BWG Iron	9 BWG Iron	¼" "	June 9, "	Aug. 5, 1917	Aug. 10, 1917
4,000	1	6 Bare Copper	6 BWG Iron	June 18, "	July 7, "	.....	
4,000	1	2 S.R. Alum	¼" Steel	Mar. 21, "	June 13, "	Aug. 23, 1917	
on L.T. 151 Poles 1 to 54,							
4,000	1	6 MHD Bare Copper	¼" "	Mar. 29, "	June 14, "	Aug. 23, "	
4,000	1	2 S.R. Alum	¼" "	Mar. 29, "	June 18, "	Aug. 23, "	
13,200	1	2 S.R. "	10 C.C. Steel	¼" "	Mar. 6, "	Apr. 22, "	Apr. 22 "
on L.T. 27 from Pole 1 to 30—55 miles.							
44,000	1	5/16 Steel	9 BWG Iron	¼" "	Aug. 17, "	.....	.....
26,400	2	1/0 B&S Cop.	9 "	¼" "	July 10, "	Oct. 12, 1917	.....
26,400	1	6 BWG Iron	9 "	¼" "	July 20, "	Sept. 22, "	.....
26,400	1	6 BWG Iron	9 "	¼" "	Aug. 1, "	Sept. 22, "	.....
13,200	1	¼" Steel	9 "	¼" "	Aug. 27, "	Oct. 27, "	.....
4,000	1	4 B & S Bare Copper	6 BWG Iron	Oct. 24, "	.....	.....	
13,200	1	4 B & S "	9 BWG Iron	9/32" Steel	Oct. 27, "	.....	.....

SYSTEM

22,000	2	4/0 Alum	10 Copper	¼" Gal. Steel	Sep. 20, 1912	Feb. 18, 1913	Feb. 24, 1913
"	1	2 "	10 "	¼" "	Sep. 20, "	Feb. 18, "	Feb. 24 "
"	2	4/0 "	10 "	¼" "	Sep. 25, "	Feb. 18, "	Feb. 24 "
"	1	2 "	10 "	¼" "	Feb. 1, 1913	May 17, "	May 27 "
"	2	4/0 "	10 "	¼" "	Oct. 20. 1912	Feb. 18, "	Feb. 24 "
"	2	2/0 "	10 "	¼" "	Nov. 6, "	Apl. 5, "	April 6 "
"	2	3/0 "	10 "	¼" "	Oct. 23, "	Feb. 18, "	Feb. 24 "
"	1	2 "	10 "	¼" "	Jan. 24, 1913	Apl. 26, "	Sep. 25 "
"	2	3/0 "	10 "	¼" "	Nov. 1, 1912	Feb. 18, "	Feb. 24 "
4,000	1	1/0 "	.....	¼" "	Aug. 15, 1914	Oct. 25, 1914	Oct. 21, 1914
22,000	2	1/0 "	10 Copper	¼" "	Apl. 1, 1916	May 5, 1916	July 24, 1916
"	2	1/0 "	10 "	¼" "	Mar. 7 "	May 5 "	July 24 "
4,000	1	1/0 "	10 "	¼" "	Oct. 15, 1914	Dec. 25, 1914	Dec. 24, 1914
22,000	2	1/0 Copper	10 "	¼" "	June 7, 1911	July 18, 1911	July 18, 1911
"	2	1/0 Alum	9 B.W.G. Iron	¼" "	Feb. 29, 1916	Apl. 14, 1916	July 24, 1916
"	1	6 Copper	9 " "	6 B.W.G. Iron	May 30 "	July 11, 1916	June 29 "
22,000	1	1/0 S R Alum	9 " "	¼" Steel	Sept. 13, 1917	.....	.....
"	1	1/0 "	9 " "	¼" "	Oct. 6, "	.....	.....
"	1	1/0 "	9 " "	¼" "	Oct. 20, "	.....	.....

SYSTEM

26,400	1	5/16 Steel	10 Copper	¼" Gal. Steel	Oct. 29, 1912	June 14, 1913	Oct. 23, 1913
"	1	5/16 "	10 "	¼" "	June 4, "	Dec. 15, 1913	Dec. 18 "
"	1	3/0 Alum	10 "	¼" "	Sept. 6, 1913	Feb. 17, 1914	Feb. 7, 1914
"	1	3/0 "	10 "	¼" "	Oct. 16, 1914	Mar. 20, 1915	Apr, 4, 1915
2,200	1	6 Copper	.....	.....	Feb. 22, 1915	Mar. 20, "	Mar. 20, "

Description of

WASDELL'S FALLS

Sec. No.	From	To	Length of Pole	Span	Miles	No. of Poles
W.L						
1	Wasdell's Falls	Jct. No. 1 Pole 1203	40	120	25.50	1,203
1a	" "	Junction Pole 183	40	120	3.94	
	Carried on W.L. 1 Poles					
2	Jct. No. 1 Pole 1203	Beaverton	40	120	1.47	70
3	Jct. No. 1 " 1203	Cannington	40	120	9.67	442
4	Beaverton	Gamebridge			6.50	
	Carried on Sec. W.L. 1 & 2 poles					
5	Gamebridge	Brechin			3.75	
	Carried on Sec. W.L. 1 poles					
6	Cannington	Woodville	30	120	5.15	147
7	Cannington	Sunderland	30	120	7.40	335
8	Jct. Pole 183 W.L. 1	Longford	35	132	6.41	269

EUGENIA FALLS

EFL						
1	Eugenia Falls Pwr. House	Chatsworth Sub-Station.	40	125	22.15	972
2	Chatsworth Sub-Station.	Owen Sound	40	125	9.22	394
3	Eugenia Falls	Flesherton	40	125	6.78	296
4	Flesherton Jct. Pole 296.	Durham Jct. Pole 964	40	125	15.97	687
5	Durham Jct. Pole 964	Mount Forest	40	125	15.70	692
6	Laurel Jct	Grand Valley	35	132	8.50	357
7	Durham Jct. Pole 964	Hanover Jct. Pole 1491	40	125	12.09	526
8	Hanover Jct Pole 1491	Chesley	40	125	11.06	473
9	Flesherton Jct. Pole 296.	Dundalk	40	125	11.73	500
10	Dundalk	Shelbourne	40	125	13.16	562
11	Hanover Jct. Pole 1491	Hanover	40	125	.76	34
12	Eugenia Falls	Markdale			6.50	
		Car'd on Sec. EFL 1, poles				
13	Eugenia Falls	Flesherton			7.50	
		Car'd on Sec. EFL 3, poles				
14	Durham Jct. 1326 E.F.L.5	Holstein	30	130	2.63	107
		Car'd on Sec. EFL 5, poles				
15	Junction Pole 1190	Kilsyth Sta	40	125	4.76	205
16	Kilsyth Station	Tara	40	125	6.80	292
17	Shelbourne	Orangeville	30	130	14.61	614
18	"	Horning's Mills	30	130	5.13	215
19	Eugenia Falls	Meaford Jct. Pole 186	35–40	132	4.00	186
20	Meaford Jct. Pole 186	Collingwood	35–40	132	20.17	885
21	Orangeville	Alton	30	132	5.75	253
22	Grand Valley	Arthur	30	120	12.50	539

MUSKOKA

M L.						
1	South Falls	Huntsville	35	132	26.32	1,142

CENTRAL ONTARIO

C.O.S.						
1607 (a) 1723	Napanee	Newburgh (Houpt Paper Mills)	30	132	7.91	
			This circuit carried on C.O.L. 50			
E-IB	Healey Falls	Trenton	40	176	30.53	975
C.O.L.						
50	Napanee Sub-Station	Kingston	40	175	26.50	863

Lines.—Continued

SYSTEM.

Voltage	No. of Circuits	Power Cables B. & S. Gauge	Telephone Wires, B.&S. & B.W.G. Gauge	Ground Wire	Work Commenced	Work Completed	In Operation
22,000	1	5/16 Steel	10 Copper	¼" Gal. Steel	Jan. 17,1914	Sep. 28, 1914	Sep. 28,1914
"	1	1/0 Alum	.....	.....	July 6, 1916	July 23, 1916	July 23,1916
"	1	¼" Steel	10 Copper	¼" Gal. Steel	Mar. 30, 1914	Sep. 28, 1914	Sep. 28,1914
"	1	¼" "	10 "	¼" "	Feb. 18, "	Sep. 28 "	Sep 28 "
4,000	1	1/0 Alum	.....	.....	May 2, "	.....	Oct. 6 "
4,000	1	1/0 "	.....	.....	July 25, "	.....	Oct. 6 "
4,000	1	1/0 "	.....	¼" Gal. Steel	May 19, "	.....	Oct. 19 "
4,000	1	1/0 "	.....	¼" "	June 1, "	July 10, 1914	Oct. 19 "
22,000	1	1/0 "	9 B.W.G.Iron	¼" "	Feb. 17, 1916	May 27, 1916	June 4, 1916

SYSTEM

22.000	2	3/0 Alum	9 B.W.G.Iron	¼"Gal .Steel	Mar. 17,1915	July 7, 1915	Nov.18,1915
"	2	3/0 "	9 "	¼" "	Apr. 7, "	Sep. 24. "	Nov. 18 "
"	2	3/0 "	9 "	¼" "	Apr. 10, "	July 21, "	Nov. 18 "
"	2	3/0 "	9 "	¼" "	Apr. 13, "	July 11, "	Nov. 18 "
"	2	5/16 Steel	9 "	¼" "	Apr. 26, "	Aug. 25, "	Nov. 18 "
"	1	6 Copper	9 "	¼" "	July 21,1916	Dec. 1, 1916	Dec. 1, 1916
"	1	3/0 Alum	9 "	¼" "	Oct. 19,1915	Aug. 19,1916	June18,1916
"	1	3/0 "	9 "	¼" "	Dec. 4 "	June 10, "	June18 "
"	1	1/0 "	9 "	¼" "	May 20 "	Aug. 14,1915	Nov.18,1915
"	1	1/0 "	9 "	¼" "	June 9 "	Aug. 24, "	Nov. 18 "
22,000	1	1/0 S.RAlum	9 "	¼" "	Aug. 18, 1916	Sep. 16, 1916	Sep. 16,1916
4,000	1	2 S.R "	.....	.....	Dec. 28, 1915	Jan. 17 "	Feb. 8 "
4,000	1	2 S.R "	.....	.....	June 4 "	Aug. 16, 1915	Nov.18,1915
4,000	1	2 S.R. "	.....	.....	Dec. 10 "	Apl. 3, 1916	Apl. 3, 1916
22,000	1	6 B.W.G.Iron	9 B.W.G.Iron	¼"Galv.Steel	Nov. 7, 1916	Jan. 31, 1917	Jan. 1, 1918
4,000	1	6 Copper....	9 "	¼" "	Oct. 12 "	Jan. 19, 1917	Jan. 1, 1918
22,000	1	6 "	10 "	¼" "	June 13 "	June. 15,1916	June13,1916
22,000	1	6 "	10 "	¼" "	June 13 "	June 13 "	June13 "
"	1	1/0 "	9 "	¼" "	Aug. 21 "	Oct. 5 "	Oct. 6 "
"	1	1/0 "	9 "	¼" "	Aug. 14 "	Oct. 5 "	Oct. 6 "
4,000	1	4 "	.....	6 B.W.G.Iron	Oct. 17 "	Nov. 22 "	Nov.27 "
4,000	1	4 "	.....	6 "	Oct. 30 "	Feb. 19, 1917	Feb. 19,1917

SYSTEM

22,000	1	2 S.R. Alum	9 B.W.G.Iron Galv.	¼"Galv. Steel	Aug. 6, 1915	Apl. 29, 1915	Aug.15,1916

SYSTEM

4,000	1	6 Copper..	.....	6 B.W.G.iron	Nov. 23, 1916	Apr. 26, 1917	Apr.23,1917
from Pole 1 to Pole 47—94 miles = 94 miles							
44,000	1	2/0 B. & S. Copper	10 C.C. Steel	¼" Steel	June 9, 1917	.....	.....
44,000	1	1/0 B & S Bare Copper	9 B.W.G.Iron	¼" "	Dec. 5, 1916	.....	.....

Total Mileage of Lines and Number of Poles

—	To Oct. 31st, 1916	Oct. 31st, 1916, to Oct. 31st, 1917	Total to Oct. 31st, 1917
Total mileage low tension lines completed and under construction	1,321.19	263.16	1,584.35
Total mileage low tension lines completed	1,241.18	154.77	1,395.95
Total mileage low tension lines under construction	80.01	108.39	188.40
Total mileage single circuit lines	937.80	247.02	1,184 82
Total mileage double circuit lines	353.20	16.14	369.34
Total mileage three circuit lines	29.09	.....	29.09
Total mileage four circuit lines	1.10	.....	1.10
Total mileage telephone lines complete	1,076.05	97.48	1,173.53
Total mileage telephone lines under construction	50.23	97.39	97.39
Number of poles	54,372	9,449	63,821

NOTE.—Under total mileage low tension lines completed Oct. 31st, 1916, to Oct. 31st, 1917, 154.77 miles, includes total mileage low tension under construction to Oct. 31st, 1916, 80.01 miles.

Total Weights and Mileages of Cable and Wire

TRANSMISSION AND TELEPHONE LINES

Cable and Wire	Wire Miles				Weight in Pounds			
	Completed to Oct. 31st, 1916	Completed Oct. 31st, 1916 to Oct. 31st, 1917	Under construction to Oct. 31st, 1917	Completed and under construction to Oct. 31st, 1917	Completed to Oct. 31st, 1916	Completed Oct. 31st, 1916 to Oct. 31st, 1917	Under construction to Oct. 31st, 1917	Completed and under construction to Oct. 31st, 1917
Aluminum	4,006.18	46.38	.....	4,052.56	2,761,601	39,423	.....	2,801,024
Steel Reinforced Aluminum	608.53	41.40	44.25	694.18	306,907	20,575	34,714	362,196
Copper Wire	567.89	211.14	213.42	992.45	859,902	212,271	365,752	1,437,925
Copper Clad Steel Wire	1,139.44	16.86	61.06	1,217.36	194,357	26,706	96,719	317,782
Galv. Iron Wire	1,033.63	363.11	133.72	1,530.46	421,649	215,124	79,563	716,336
Galv. Steel Cable	1,196.61	28.80	67.50	1,292.91	758,171	19,929	79,312	857,412
Totals	8,552.28	707.69	519.95	9,779.92	5,302,587	534,028	656,060	6,492,675

The Mileage of Lines Tabulated According to Voltage and Number of Circuits

Transmission Lines

—	Single Circuit Totals			Double Circuit Totals			Three Circuit Totals			Four Circuit Totals			1-2-3-4-Circuit Totals			
Voltage	Completed to Oct. 31, 1916	Completed Oct. 31, 1916 to Oct. 31, 1917	Under Construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916 to Oct. 31, 1917	Under Construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916 to Oct. 31, 1917	Under Construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916 to Oct. 31, 1917	Under Construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916 to Oct. 31, 1917	Under Construction to Oct. 31, 1917	Completed to Oct. 31, 1917
46,000 44,000	1.93	....	79.53	....	....	....	15.50	....	....	....	....	....	17.43	....	79.53	17.43
26,400..	236.88	41.62	....	108.32	15.83	....	11.46	....	....	1.10	....	....	357.76	57.45	....	415.21
22,000..	191.67	14.75	14.75	142.67	....	....	....	....	....	....	....	....	334.34	14.75	14.75	349.09
13,200..	290.55	18.29	3.11	88.54	....	....	.09	....	....	....	....	....	379.18	18.29	3.11	397.47
12,000..	....	....	....	1.25	.31	....	....	....	....	....	....	....	1.25	.31	....	1.56
6,600..	13.00	....	....	3.75	....	....	2.04	....	....	....	....	....	18.79	....	....	18.79
4,000..	113.26	63.97	11.00	....	....	....	....	....	....	....	....	....	113.26	63.97	11.00	177.23
2,200..	18.54	....	....	.63	....	....	....	....	....	....	....	....	19.17	....	....	19.17
Total.	865.83	138.63	108.39	345.16	16.14	....	29.09	....	....	1.10	....	....	1,241.18	154.77	108.39	1,395.95

Gauge, Length and Weight of Conductors

TRANSMISSION LINES

Browne & Sharpe Gauge	Wire Miles			Weight Pounds			Miles Single Circuit Lines			Miles Double Circuit Lines			Total Single Circuit and Double Circuit Lines completed Oct. 31, 1917
	Completed to Oct. 31, 1916	Completed Oct. 31, 1916, to Oct. 31, 1917	Under construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916, to Oct. 31, 1917	Under construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916, to Oct. 31, 1917	Under construction to Oct. 31, 1917	Completed to Oct. 31, 1916	Completed Oct. 31, 1916 to Oct. 31, 1917	Under construction to Oct. 31, 1917	
400,000 c.m. Alum.	1.54	.....	.....	3,032	.....	.....	.49	.....	.....	.....	.....	.....	.49
4/0 Aluminum.....	183.85	.....	.....	243,049	.....	.....	.....	.....	.....	30.49	.....	.....	30.49
3/0 "	2,041.50	46.38	.....	1,698,527	39,423	.....	217.50	.....	.....	214.20	7.73	.....	439.43
2/0 "	89.46	.....	.....	58,954	.....	.....	.....	.....	.....	14.20	.....	.....	14.20
1/0 "	1,045.01	.....	.....	546,539	.....	.....	225.16	.....	.....	53.25	.....	.....	278.41
2 "	644.82	.....	.....	211,500	.....	.....	117.85	.....	.....	43.43	.....	.....	161.28
2 S.R "	568.66	41.40	.....	276,367	20,575	.....	180.53	13.80	.....	.....	.....	.....	194.33
1/0 S.R "	39.87	.....	44.25	30,540	.....	34,714	12.66	.....	14.75	.....	.....	.....	12.66
250,000 c.m. Copper	1.54	.....	.....	6,246	.....	.....	.49	.....	.....	.....	.....	.....	.49
4/0 Copper.....	154.35	.....	.....	520,931	.....	.....	.....	.....	.....	16.75	.....	.....	16.75
2/0 "	9.00	25.59	91.59	19,107	55,786	199,666	2.86	7.91	30.53	.....	.31	.....	11.08
1/0 "	98.99	48.60	79.50	1,166,599	83,883	137,217	31.43	.....	26.50	.....	8.10	.....	39.53
2 "	10.71	.....	.....	11,331	.....	.....	3.40	.....	.....	.....	.....	.....	3.40
4 "	53.00	54.75	42.33	35,244	37,339	28,869	15.57	18.25	14.11	.63	.....	.....	34.45
6 "	240.30	82.20	.....	100,444	35,263	.....	76.29	27.40	.....	.....	.....	.....	103.69
1/4 in. Steel Cable.	.....	28.80	.....	.....	19,929	.....	.....	9.60	.....	.....	.....	.....	9.60
5/16 " Steel Cable.	.....	.....	67.50	.....	.....	79,312	.....	.....	22.50	.....	.....	.....	.....
6 B.W.G. Iron	.....	185.01	.....	.....	109,155	.....	.....	61.67	.....	.....	.....	.....	61.67
Totals.....	5,182.60	512.73	325.17	4,928,410	401,353	479,778	884.23	138.63	108.39	372.95	16.14	.....	1,411.95

NOTE.—A total of 16.00 miles occurs twice in the total mileage, due to there being circuits of different conductors on the same line.

Total Mileage Low Tension Telephone Lines

COMPLETED AND UNDER CONSTRUCTION TO OCTOBER 31, 1917

Sect. No.	Miles	Sect. No.	Miles	Sect. No.	Miles	Sect. No.	Miles	Sect. No.	Miles	Sect. No.	Miles	Sect. No.	Miles
L.T. 1..	2.84	L.T. 30	1.27	L.T. 72	6.48	L.T. 108	13.03	L.T. 147	7.61	S.L. 24	E 4.00	E.F.L. 10	13.16
" 2..	6.34	" 31	1.56	" 73	5.00	" 109	.02	" 148	11.36	" 25	E 4.50	" 11	.76
" 3..	1.13	" 32	.09	" 74	10.50	" 111	5.84	" 149	8.84	" 26	E 6.25	" 15	E 6.25
" 4..	.18	" 34	14.07	" 75	1.93	" 112	3.48	" 150	13.61			" 16	E 7.25
" 5..	1.64	" 35	.12	" 79	.43	" 113	14.20	" 157	10.82			" 17	E 14.61
" 6..	.76	" 36	5.75	" 81	1.10	" 114	8.90	" 163	.52	St. L. 1	22.96	" 18	E 5.13
" 7..	12.27	" 38	7.35	" 82	2.27	" 118	.37	" 164	E 22.50	" 2	16.29	" 19	4.00
" 8..	9.90	" 39	.63	" 83	1.30	" 119	.09	" 165	8.10	" 3	6.52	" 20	20.17
" 9..	11.12	" 40	1.50	" 84	1.93	" 123	14.60	" 172	1.42	" 5	14.08		
" 10..	10.30	" 40 A	1.92	" 85	14.61	" 124	9.83	" 173	8.88				
" 11..	4.59	" 41	12.27	" 86	1.18	" 125	9.72	" 174	9.60				
" 12..	1.13	" 43	1.21	" 87	1.96	" 126	9.52	" 179	3.11	W.L. 1	25.50	C.O.S.	
" 13..	1.75	" 45	.09	" 88	7.41	" 127	8.02			" 2	1.47	1,607 A	7.91
" 14..	2.04	" 46	2.22	" 89	1.20	" 128	9.09			" 3	9.67	C.O.S.	
" 15..	2.08	" 47	14.36	" 90	6.83	" 129	12.75	S.L. 1	4.29	" 8	6.41	1,723 E	I B 30.53
" 16..	3.75	" 48	5.87	" 94	5.08	" 131	21.78	" 2	1.16				
" 17..	.14	" 49	3.79	" 95	10.15	" 132	4.85	" 3	15.86			C.O.L 50	26.50
" 18..	.79	" 50	4.98	" 96	6.58	" 133	7.92	" 4	.42	M.L. 1	26.32		
" 19..	1.54	" 55	1.68	" 97	4.00	" 135	7.73	" 5	4.55				
" 20..	1.22	" 57	1.93	" 98	9.27	" 136	13.24	" 6	12.27				
" 21..	3.56	" 57 A	.08	" 99	9.18	" 137	7.50	" 7	15.07	E.F.L 1	22.15		
" 22..	1.71	" 58	6.42	" 100	1.25	" 138	11.90	" 8	1.50	" 2	9.21		
" 23..	.31	" 59	5.82	" 101	16.91	" 139	.96	" 9	11.86	" 3	6.78		
" 24..	3.55	" 62	16.65	" 102	1.48	" 140	12.65	" 12 A	3.59	" 4	15.97		
" 26..	2.74	" 65	9.03	" 103	9.98	" 141	2.77	" 14 A	4.02	" 5	15.70		
" 26 A	.24	" 66	1.64	" 104	8.50	" 142	10.48	" 15	.50	" 6	8.50		
" 27..	11.24	" 68	3.21	" 105	7.40	" 143	6.11	" 17	4.50	" 7	12.09		
" 28..	1.27	" 69	6.66	" 106	6.10	" 145	20.50	" 20	1.34	" 8	11.06		
" 29..	1.50	" 71	10.93	" 107	6.44	" 146	6.81	" 21	14.34	" 9	11.73		

"E" estimated

Total 1,270.92 miles

Size of Telephone Wire used on Telephone Lines

COMPLETED OCT. 31, 1916–OCT. 31, 1917

Section No.	Mileage	Gauge	Section No.	Mileage	Gauge
		No.			
L.T. 135	7.73	9 B.W.G. Iron			
" 145	20.50	9 " "			
" 157	10.82	9 " "			
" 163	.52	10 C.C. Steel			
" 165	8.10	9 B.W.G. Iron			
" 172	1.42	9 " "			
" 173	8.88	9 " "			
" 174	9.60	9 " "			
E.F.L. 6	8.50	9 " "			
" 15	6.25	9 " "			
" 16	7.25	9 " "			
C.O.S. 1607a	7.91	10 C.C. Steel			
Total	97.48		Total		

Size of Telephone Wire used on Telephone Lines

UNDER CONSTRUCTION OCT. 31, 1917

Section No.	Mileage	Gauge	Section No.	Mileage	Gauge
		No.			
L.T. 164	E 22.50	9 B.W.G. Iron.			
" 179	3.11	9 " "			
S.L. 24	E 4.00	9 " "			
" 25	E 4.50	9 " "			
" 26	E 6.25	9 " "			
C.O.S. 1723, E-1B.	30.53	10 C.C. Steel			
C.O.L. 50	26.50	9 B.W.G. Iron			
Total	97.39		Total		

"E" estimated

Gauge, Length and Weight of Copper Clad Steel and Galvanized Iron Wire

TELEPHONE LINES

Gauge	Wire Miles				Weight in Pounds				Single Circuit Mileage			
	Completed to Oct. 31st, 1916	Completed Oct. 31st, 1916 to Oct. 31st, 1917	Under construction to Oct. 31st, 1917	Completed and under construction to Oct. 31st, 1917	Completed to Oct. 31st, 1916	Completed Oct. 31st, 1916 to Oct. 31st, 1917	Under construction to Oct. 31st, 1917	Completed and under construction to Oct. 31st, 1917	Completed to Oct. 31st, 1916	Completed Oct. 31st, 1916 to Oct. 31st, 1917	Under construction Oct. 31st, 1917	Completed and under construction to Oct. 31st, 1917
No. 8 B. & S., C.C. steel..	207.52	.....	.....	207.52	50,842	.....	.....	50,842	103.76	.....	.....	103.76
No. 10 " "	928.98	16.86	61.06	1,006.90	145,529	26,706	96,719	268,954	464.49	8.43	30.53	503.45
No. 9 B.W.G. iron..	832.74	178.10	133.72	1,144.56	253,984	105,969	79,563	439,516	416.37	89.05	66.86	572.28
No. 10 " "	283.32	.....	.....	283.32	70,580	.....	.....	70,580	141.66	.....	.....	141.66
Totals...	2,252.56	194.96	194.78	2,642.30	520,935	132,675	176,282	829,892	1126.28	97.48	97.39	1,321.15

SECTION III

OPERATION OF THE SYSTEMS

NIAGARA SYSTEM

Continued expansion characterized the operation of the Niagara System for the year 1917.

The increasing power requirements of the existing war munitions industries, and the addition of others, together with the normal yearly growth of the municipalities' demands, severely taxed the available generator capacity at Niagara Falls. However, up to the end of October, the Commission was enabled to meet its obligations, with a few exceptions.

On November 7th, the Commission's source of power supply was augmented by arrangements with the Canadian-Niagara Power Company, whereby the output of one 10,000 h.p. generator was paralleled with two generators already in operation on the Niagara Transformer Station bus. On December 17th, a fourth generator of the same capacity was added, and on July 4th, by a regrouping of the generators at the company's plant which supply power to the Commission, one more unit was placed at the Commission's disposal, making in all 50,000 horsepower.

While the power supplied from this company was at times reduced on account of generator failures and ice trouble, the service was quite satisfactory under normal operating conditions.

On August 1st, the operation of the generating plant, transformer stations, transmission lines and sub-stations of the Ontario Power Company was placed under the supervision of the Commission, in the interests of the Ontario Power Company, and while to date no radical change has been made in the method of operation, the resulting combination promises innumerable advantages with regard to improved service and increased economy in operation and maintenance. Several changes in the physical arrangement of the plant are well under way. One purpose of these changes is to permit of direct voltage regulation from the generating station, which will fulfill a long felt want. These changes will also increase the facilities for sectionalizing trouble.

The Niagara System was visited with electrical storms on sixty-three different days during the summer. On thirteen occasions, storms were reported over practically the entire system, of which seven were severe and the balance mostly moderate. Particularly violent disturbances were reported from Niagara Falls, while very severe concentrations occurred in St. Mary's, London, St. Thomas and Chatham districts. Only one total system high-tension interruption occurred, which could be directly attributed to lightning discharges.

The performance of the transmission high-tension lines was particularly gratifying during the past year. The line conductors required little or no attention, and inspections made from time to time confirmed the belief that the cable now in operation should not be the subject of concern relative to the reliability of the service. No failures of high-tension line insulators occurred during the year, and the results of the periodic megger tests of the dielectric strength of the units shews little or no deterioration in the strings erected during the last four years.

Some very interesting comparative figures from an engineering standpoint have been obtained from the tests of the various makes of insulators erected.

As the abnormal condition of the metal market rendered the purchase of line conductors for the new tower line between Dundas and Toronto injudicious for the present, and as an unusually large increase in the load supplied to Toronto munition plants and to the Imperial Ministry of Munitions and to other plants in the vicinity of New Toronto was anticipated, the Commission decided that for the welfare of the service the cross-section of the conductor forming the two No. 3/0 aluminum circuits on the old tower line should be increased. Accordingly, preparations were made to take down the old cable for re-fabrication at the factory, and the erection of No. 6/0 steel reinforced aluminum. A considerable portion of the extra aluminum required was obtained from scrap on hand, and some by replacing the aluminum conductor on other lines with iron wire, where the conductivity of those lines was considered greater than necessary for the present. On account of the high price of aluminum, the transfer proved decidedly economical, without any impairment of the service.

The restringing of the old tower line was commenced on May 20th and was practically completed in the month of October. The cost of the work indicates that financially it was very advantageously undertaken.

While the restringing of the section was being proceeded with, the operating features of this line were improved by the erection of a wooden structure at the Cooksville high-tension station. On this structure are mounted disconnecting switches, by means of which one circuit may now be switched to the other, or either line opened for sectionalizing purposes; also permitting the Cooksville high-tension station to be fed directly from either of the high-tension lines at this point. Other construction work completed by the line maintenance gangs outside of their regular duties follow.

The four telephone circuits on the wood pole line paralleling the old tower line between Niagara Falls and Dundas to a point just north of the Welland Canal to Niagara Falls, were transferred to the wood pole line which parallels the new tower line.

The No. 3/0 aluminum cable on the high-tension section between Kitchener and Stratford high-tension stations was replaced in the spring with 7 strand No. 9 steel cable. This change was proceeded with after a rather extensive investigation of the properties of the steel cable for the transmission of electrical energy. The mechanical performance of the new conductor was very satisfactory.

The 13,200 volt feeder between the Guelph high-tension station and the Fergus and Elora taps was double circuited by the erection of a circuit of No. 3/0 aluminum cable. An air-break switch and structure was erected at the corner of York road and Victoria streets in the municipality of Guelph, for the purpose of forming a break-down connection between the Guelph 13,200-volt system and the Fergus and Elora tap line, for emergency use.

The Commission purchased and took over the Interurban Power Company, and the Erindale Power Company's properties on January 11th, and proceeded to change the method of feeding the former customers of these companies to a more economical basis. The 13,200-volt No. 0 copper circuit, between the Interurban Company's Mavety street station in Toronto Junction, and the Ontario National Brick Company's plant, was removed and placed in stock. The No. 0 aluminum cable between the Mavety street station and the Erindale powerhouse was also removed, and the aluminum cable used for the restringing of high-tension Section

B. The brick company was temporarily fed from the Cooksville high-tension station on February 11th, from a connection to the feeder supplying the Mimico and Port Credit distributing stations, and later on, from a new circuit running north from the Cooksville high-tension station and then west on Dundas street to the company's yards. The customers of the Interurban Power Company of Etobicoke Township, formerly fed from the company's sub-station in New Toronto, were finally supplied with power from the Niagara System on July 31st.

A three-phase circuit of No. 0 aluminum was strung from the switching structure No. 290, at the Village of Beachville, to the new distribution station erected a little to the west of the village. The No. 1/0 aluminum circuit between Beachville and Embro was replaced with ¼-inch stranded steel conductor. By reason of the high market value of aluminum, the capital cost of this section was decreased by over twice the cost of the new conductor, plus erection.

The No. 3/0 aluminum conductor on the 4,000-volt circuit between the villages of Tilbury and Comber was replaced with 5/16-inch steel cable. In this case, the original capital expenditure was reduced nearly three times the cost of the steel conductor, plus erection.

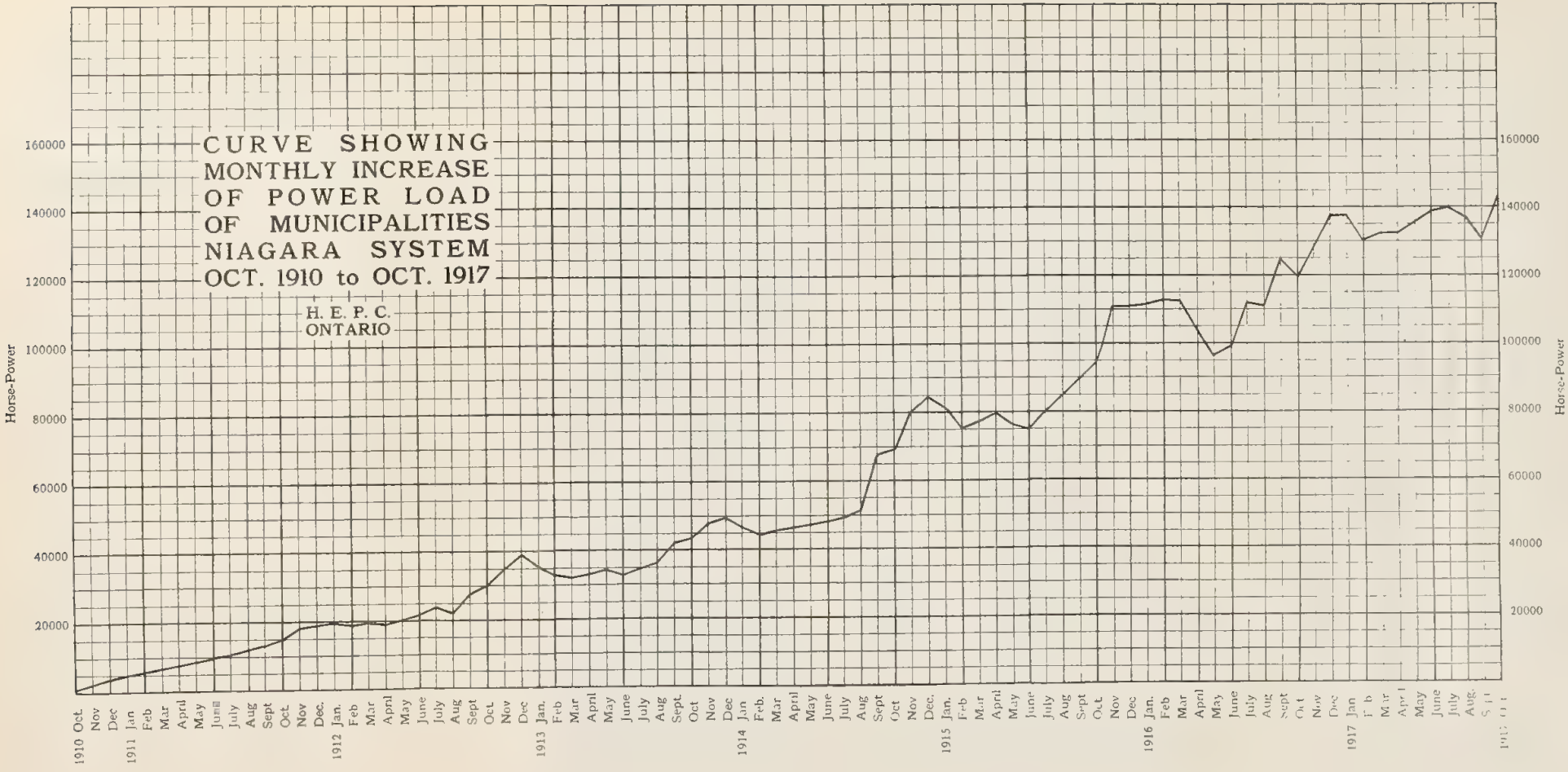
The 13,000-volt circuits of the Baden distributing station were rearranged, and two air break disconnecting switches erected to accommodate the new feeder to the Village of Wellesley.

Extensions made to several of the high-tension and smaller distributing stations relieved the somewhat overloaded condition of the latter part of 1916, which permitted the station maintenance department to internally inspect and thoroughly overhaul the electrical and mechanical apparatus to provide against the anticipated increase in load during the coming winter. Failures of the station equipment were quite insignificant, and no difficulty was experienced in effecting repairs. As in the past years, several transfers of equipment from one station to another were carried out, where unexpected power demands developed.

The meter inspection department designed and erected pole-type, out-door metering equipment to measure the power supplied to the villages of Springfield and Burgessville, Zurich, Dashwood and Otterville, and indoor equipment at the Tillsonburg and Norwich municipal stations, to obtain a graphic record of the load of the rural customers from these stations. During the year a large amount of work was accomplished in connection with the tests and adjustments of meters and protective equipment in operation on the local distribution systems.

During the summer an engineer of this department made a thorough investigation of the methods of power measurement and service protecting devices, employed by some of the largest electrical corporations in the United States under actual working conditions. Where comparison is possible, it was found that the methods in use on the Commission systems are not excelled.

The tables given below shew the load demand of the various municipalities, as well as the increase during the year. The plotted curve on another page shows the monthly peak load taken by the Commission from the supply sources, from October, 1910, to October, 1917. If no shortage of generating capacity had occurred at Niagara Falls, the gradient of increase for the past year would have been very much greater.


CURVE SHOWING
MONTHLY INCREASE
OF POWER LOAD
OF MUNICIPALITIES
NIAGARA SYSTEM
OCT. 1910 to OCT. 1917
H. E. P. C.
ONTARIO
Horse-Power
160000
140000
120000
100000
80000
60000
40000
20000
1910 Oct
Nov
Dec
1911 Jan
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec.
1912 Jan.
Feb
Mar
April
May
June
July
Aug
Sept
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Nov
Dec
1913 Jan.
Feb
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July
Aug
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Nov
Dec
1914 Jan
Feb.
Mar
April
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July
Aug
Sept
Oct
Nov
Dec.
1915 Jan.
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
1916 Jan.
Feb
Mar
April
May
June
July
Aug
Sept
Oct
Nov
Dec
1917 Jan
Feb
Mar
April
May
June
July
Aug.
Horse-Power

Municipality	Load in H.P. Oct., 1916	Load in H.P. Oct., 1917	Increase in H.P.
Toronto	38,465	50,167	11,702
Dundas	548	597	49
Hamilton	8,562	11,622	3,060
Waterdown	71	65	.....
Caledonia	55	53.6	.....
Hagersville	97.8	99	1.2
London	7,359	8,552.5	1,193.5
Thorndale	22.8	22.8	.....
Thamesford	26.5	20.1	.....
Guelph	2,549.5	3,075	525.5
Ontario Agricultural College	160	146.7	.....
Military Hospitals Commission	203.5	182.3	.....
Rockwood	11.9	12.3	.4
Georgetown	300	348.3	48.3
Acton	70.3	192	121.7
Preston	1,149	1,150	1
Galt	2,285.5	2,466.5	181
Hespeler	450.4	338	.....
Breslau	30	30	.....
Kitchener	3,262	4,280	1,018
Waterloo	815	862	47
Elmira	109.9	134	24.1
New Hamburg	76.4	162.2	85.8
Baden	196.5	153	.....
Stratford	1,448	1,519	71
Mitchell	148.8	175.6	26.8
Seaforth	387.4	536	148.6
Clinton	101.8	106	4.2
Goderich	214.5	264.6	50.1
St. Mary's	434.3	396.7	.....
Woodstock	1,170	1,331	161
Ingersoll	792	858	66
Tillsonburg	242.6	296	53.4
Norwich	171.6	252.6	81
Beachville	96.5	167.6	71.1
St. Thomas	2,011	2,037.5	26.5
Port Stanley	75	70.4	4.6
Brantford	1,783	2,536	753
Paris	398	356.5	.....
Port Credit	59.6	67	7.4
Weston	197	754	557
Brampton	658.8	933	276.2
Milton	355	334	.....
Mimico	156.1	184	27.9
Mimico Asylum	31.5	30.8	.....
Provincial Brick Yard	136	128.7	.....
New Toronto	291	1,509.5	1,218.5
Toronto Township	99.1	45	.....
Cooksville	22.7	30	7.3
Dixie			
Windsor	1,502.6	1,852	349.4
Walkerville	1,576.5	1,972	395.7
Elora	77.7	130.3	52.6
Fergus	92.5	82.8	.....
Welland	5,626	4,283	.....
St. Catharines	2,433	4,520	2,087
Port Dalhousie	79	87.1	8.1
Strathroy	203.7	291.6	87.9
Drumbo	10.9	14.8	3.9
Plattsville	57.6	60.3	2.7
Woodbridge	76.4	86.6	10.2
Ayr	36.2	43	6.8
Princeton	10.4	10.3	.....
Embro	28.1	27.3	.....
Chatham	509.4	888.7	379.3

Municipality	Load in H.P. Oct., 1916	Load in H.P. Oct., 1917	Increase in H.P.
Lucan	30.2	142	111.8
Bolton	95.2	96.5	1.3
Mt. Brydges	26.8	25.7	.....
Wallaceburg	277.5	419.5	142
Delaware	8.9	8	.....
Tilbury	63	66.3	3.3
Simcoe	103.2	131.4	28.2
Waterford	97.8	105.6	7.8
Lambeth	17.9	18.5	.6
Grantham Township	17.4	10.1	.....
Dresden	68.3	70.6	2.3
Dorchester	16	14.7	.....
Comber	21.4	20	.....
Burford	31.5	32.7	1.2
Bothwell	28.1	62.5	34.4
St. George	38.2	30.1	.....
Dutton	44.9	44.5	.....
Thamesville	45	42.2	.....
Blenheim	77.7	81.7	4
Lynden	79.7	83.7	4
Ailsa Craig	16	80.4	64.4
Otterville	11.7	13.4	1.7
Exeter	77.7	123.3	45.6
Granton	12.4	41.3	28.9
Niagara Falls	2,364.5	2,304	.....
Petrolia	14.6	284	138
Wyoming	22.7	28	5.3
Ridgetown	91.1	136.3	45.2
Milverton	33.5	189	155.5
Listowel	117.9	184.5	66.6
Palmerston	93	88.5	.....
Harriston	52.9	98	45.1
Tavistock	28	220	192
Wellesley	13.4	114.6	101.2
Burgessville	8	35	27

A list of the municipalities connected during the year 1917.

Municipality	Date connected	Initial Load in H.P.	Load in H.P. Oct., 1917	Increase in H.P.
St. Jacobs	Aug. 28, 1917	72.4	72.4	.....
Stamford Township	Nov. 5, 1916	387.5	454.4	66.9
Sarnia	Nov. 10, 1916	268	1,126	858
Highgate	Nov. 6, 1916	13.6	18.7	5.1
Forest	Feb. 7, 1917	56.3	69.3	13
Watford	Aug. 11, 1917	49.6	49.6	.....
Dublin	Sept. 25, 1917	7.5	7.5	.....
Rodney	Jan. 15, 1917	24	31	7
West Lorne	Dec. 22, 1916	21.4	25.5	4.1
Etobicoke Township	July 31, 1917	85.8	97.8	12
Hensall	Dec. 21, 1916	37.5	26.8	.....
Dashwood	Aug. 24, 1917	35	35	.....
Zurich	Aug. 24, 1917	14.7	55	40.3
Springfield	July 7, 1917	20.4	21.4	1

Niagara System

Capital Investment of the Niagara System in operation at October 31, 1917:

Right-of-Way	$1,115,779 81
Steel Tower Transmission Lines	3,317,432 39
Telephone Lines	129,706 69
Relay System Lines	54,537 32
Wood Pole Lines	2,077,156 36
Transformer Stations, including conduit system (Ontario Power Co. to Niagara Station)	3,286,967 30
Distributing Stations	267,547 07
Total Operating Capital	$10,249,126 94

Total Expenditures in connection with the Operation and Maintenance of Niagara System for the fiscal year 1916-17:

Operators' Salaries and Expenses, including supplies		$105,955 64
Maintenance of Steel Tower Lines		81,241 81
" Telephone and Relay Lines		9,549 12
" Low Tension Lines		55,074 17
" Transformer Stations		73,533 60
" Distributing Stations		23,135 77
Administration		58,922 02
		$407,412 13
Interest on Invested Capital	$432,540 73	
Cost of Power at Niagara Falls	1,310,713 95	
		$1,743,254 68

Summary of Financial Statement of the Niagara System Operation for the fiscal year 1916-17:

Receipts

Power delivered, including charges for Administration, General Expense, Operation, Maintenance and Interest	$2,637,606 31

Disbursements

Power purchased, including losses in Transmission and Transformation, Administration, General Expense, Operation, Maintenance and Interest	2,150,666 81
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$486,939 50

SEVERN SYSTEM

The power demand of the municipalities served from the Severn System increased 53 per cent. over that supplied during the year 1916. Parallel operation of the generating stations at the Big Chute, Eugenia and Wasdell's Falls enabled the Commisssion to meet the increased demand and to provide first-class service with regard to character and continuity.

No serious failures of equipment occurred in the generating station or transformer stations from lightning discharges or other causes. The transmission lines were carefully gone over during the summer and the spans sags adjusted, poles straightened and backfilled where necessary.

Negotiations were completed for the purchase from the Orillia Water and Light Commission of the seven and one-half miles of 22,000-volt single, three-phase circuit of No. 2 aluminum conductor extending from the Big Chute plant to a point approximately south of the Orillia Commission's new hydraulic power house, at Swift Rapids. From this point a circuit of No. 3/0 aluminum cable will be erected to the Swift Rapids plant, a distance of five-eighths of a mile. This tap will form the permanent connection between the Big Chute and Swift Rapids plants, thereby completing the link between the Severn and the Wasdell's System by the use of the Orillia Commission's lines as per arrangements by contract.

To facilitate operation and maintenance the switching structure at the point where the Victoria Harbor tap line branches from the trunk lines was remodelled and the single pole disconnecting switches were replaced with two-pole switches in order that the Victoria Harbor tap might be switched to either of the trunk lines at the junction point.

Another improvement of this nature was effected by the erection of two horn-gap, air-break switches in the two main 22,000-volt lines near the Village of Elmvale for sectionalizing purposes. Two three-phase disconnecting switches were erected on the System switching structure at Waubaushene, so that the local distributing station could be served from either of the main lines at this point. A three-phase, air-break line disconnecting switch was erected on a pole structure outside of the Victoria Harbor sub-station to act as an incoming line switch at this station.

The extra right-of-way purchased along the transmission line between the Port McNicoll Junction and the Canadian Pacific Railway elevator was cleared of trees.

Switching and transformer equipment was installed at the Big Chute power house, and a small 2,200-volt distribution system was erected to supply the Department of Railways and Canals with power and light for the marine railway installed at the Big Chute plant. This system was put into commercial operation about the middle of October, 1917.

In the latter part of August the service from the original Midland station was discontinued, and resumed from the new distributing station erected adjacent to the municipality's waterworks station.

The two pole line entrance structure at the Collingwood distribution station was remodelled so as to accommodate double circuit lines from the Severn and single circuit lines from the Eugenia Systems, and also the outgoing 2,200-volt distributing circuits.

Severn System

Municipality.	Load in H.P. 1916	Load in H.P. Oct., 1917	Increase in H.P.
Midland	815	1080.5	265.5
Penetang	495	435.6	.....
Collingwood	888.7	1986	1097.3
Barrie	541.5	487.2	.....
Coldwater	34.8	36.8	2
Elmvale	36.2	47	.8
Stayner	56.3	54	.....
Creemore	38.8	47	8.2
Orillia	1414	2111	697
Waubaushene	16.8	22.7	5.9
Port McNicoll	19.3	34	4.7
Victoria Harbor	26.8	28.4	1.6
Camp Borden	325.7	323	.....
C. P. R. Elevator	1176.6	1160.1	.....

Severn System

OPERATING STATEMENT, FISCAL YEAR 1916-17.

Capital Investment as at October 31, 1917:

Big Chute Power Development, including Generating and Transformer Station	$350,713 28
Transmission Lines	348,520 12
Distributing Stations	82,861 13
Total Operating Capital	$782,094 53

Total Expenditures in connection with the Operation and Maintenance of the Severn System for the fiscal year 1916-17:

Operators' and Patrolmen's Salaries and Expenses, and proportion of Administration and General Office Expense	$31,041 21
Cost of Power purchased from Wasdell's and Eugenia Systems	58,917 45
Interest on Capital Investment	32,364 54
	$122,323 20

Summary of Financial Statement of the Severn System Operation for the fiscal year 1916-17:

Receipts

Power delivered, including charges for Administration, General Expense, Operation, Maintenance and Interest	$172,792 75

Disbursements

Power purchased, including losses in Transmission and Transformation, Administration, General Expense, Operation, Maintenance and Interest	122,323 20
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$50,469 55

EUGENIA SYSTEM

The second year's operation of the Eugenia System was successfully concluded on November 18, 1917, with very bright prospects for the future. The quality of service supplied was exceptionally good, the operating characteristics of the equipment in the generating and transformer stations meeting the manufacturer's guarantees very satisfactorily.

The Eugenia generating station continued to assist the Big Chute plant to supply the increased demand of the municipalities of the Severn System with any surplus capacity not required by the municipalities of the Eugenia System. The average credit in horsepower to the Eugenia System in this respect was 1,635.

The Grand Valley distributing station was made alive December 1st. This station is fed over a 22,000-volt No. 6 copper circuit from a tap off the feeder to Orangeville at Laurel Junction. The villages of Grand Valley and Arthur are served from this station with 4,000-volt power. The new distributing stations at Orangeville and Shelburne were placed in operation on February 11th and November 26th respectively. Service was formerly supplied to these customers from the old sub-stations taken over with the Pine River System.

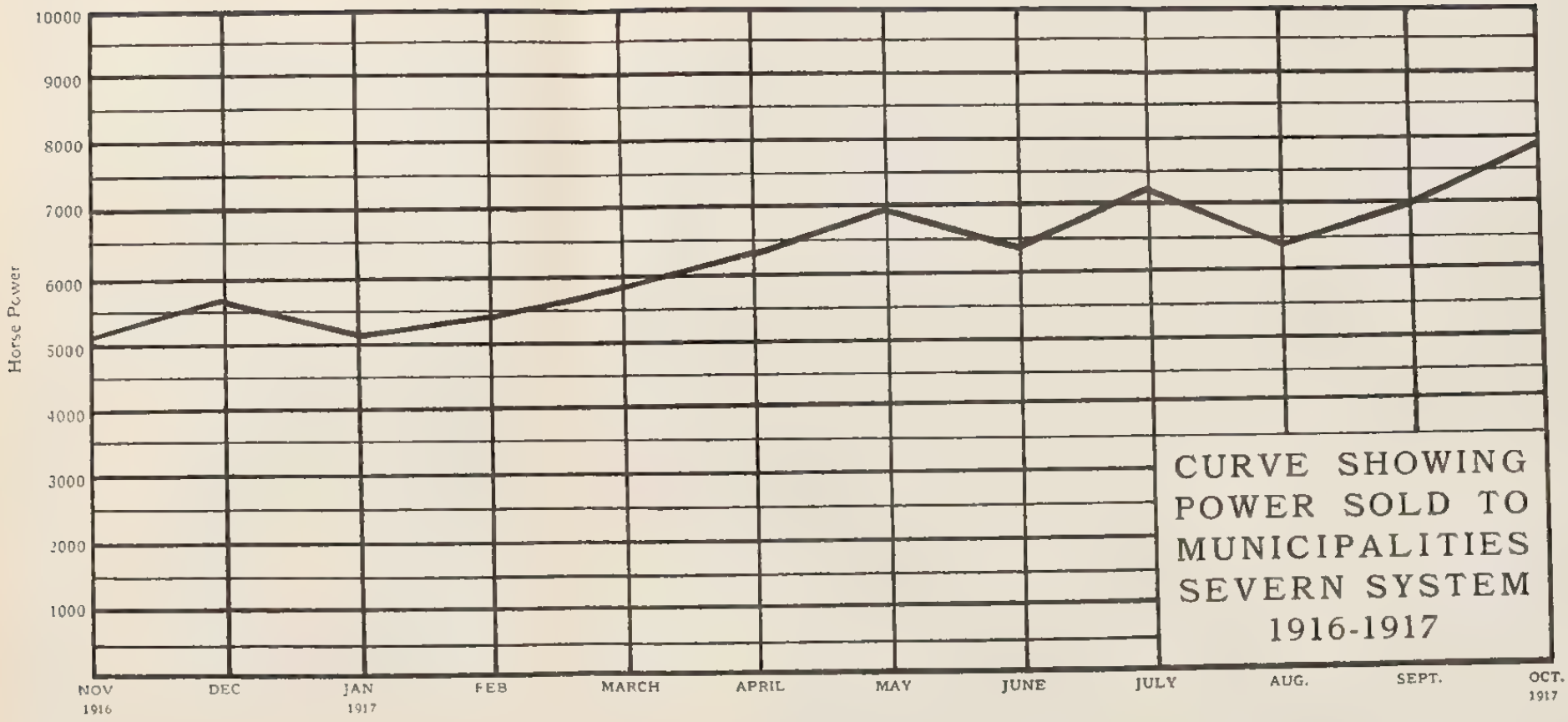
The comparatively new transmission lines of this system were gone over carefully and the span sags adjusted and the poles backfilled and tree trimming done by the line maintenance department where necessary.

The out-going 22,000-volt lines on the pole structure at the power house were removed to conform with some alterations which were made in the high-tension equipment of the station to properly control the tie line from the Eugenia to the Severn System. To benefit operation and maintenance of the south and west portions of the system the telephone line between the power house and the Village of Flesherton was double circuited by the erection of another circuit of No. 9 iron wire. This allows for a separate telephone circuit for the south and the west parts of the system.

Flashboards were installed on the dam to give additional storage and a motor boat was purchased for maintenance use on the storage basin. Plans have been prepared for a suitable barn to be erected near the power house to properly accommodate the transportation equipment in use at this point. Considerable lumber on the Commission's property is available for this work. A water supply was provided for the operators' cottages by piping to a boxed spring on the escarpment. The approach to the power house from the south was refilled and put in good condition.

Eugenia System

Municipality	Load in H.P. 1916	Load in H.P. Oct., 1917	Increase in H.P.
Owen Sound	992	978.5	.....
Flesherton	36.2	33.5	.....
Dundalk	50.2	75.3	25.1
Durham	63.9	60.3	.....
Mount Forest	98.5	106.2	7.7
Chatsworth	25.4	15.2	.....
Markdale	60	73	13
Holstein	6.9	6.4	.....
Chesley	80.4	90	9.6
Shelburne	51.2	94.7	43.5
Orangeville	128.7	94.5	.....
Horning's Mills	5	4.7	.....


Horse Power
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
NOV
1916
DEC
JAN
1917
FEB
MARCH
APRIL
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
1917
CURVE SHOWING
POWER SOLD TO
MUNICIPALITIES
SEVERN SYSTEM
1916-1917

Municipalities connected during the year 1917.

Municipality.	Date connected.	Initial Load in H.P.	Load in H.P. 1917	Increase in H.P.
Grand Valley	Dec. 1, 1916	20	41.5	21.5
Arthur	Dec. 1, 1916	25	41	16

Eugenia System

Operating Statement, Fiscal Year 1916-17.

Capital Investment as at October 31, 1917:

Eugenia Falls Power Development and Generating Plant	$646,856 32
Distributing Stations	72,857 09
Transmission Lines	470,718 72
Total Operating Capital	$1,190,432 13

Total Expenditures in connection with the Operation and Maintenance of the Eugenia System for the fiscal year 1916-17:

Operators' and Patrolmen's Salaries and Expenses, and proportion of Administration and General Office Expense	$25,473 35
Interest on Capital Investment	55,762 04
	$81,235 39

Summary of Financial Statement of the Eugenia System Operation for the fiscal year 1916-17:

Receipts

Power delivered, including charges for Administration, General Expense, Operation, Maintenance and Interest	113,169 89

Disbursements

Operation, Maintenance, Administration, General Office Expense and Interest	81,235 39
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$31,934 50

WASDELL'S SYSTEM

The operation of the Wasdell's Station during the past year was attended with good results. The increase of the municipalities' load, while not large, compared very favorably with that of corporations of the same population on the other systems.

The surplus capacity of the generating station was constantly required on the Severn System. Reports show that the system is in excellent operating condition, with no indication of excessive depreciation.

At the power house an addition was made to the switchboard to provide metering and protective equipment on the tie line between the power house and the Severn System. Several minor improvements were carried out by the operators at the power house, such as painting the floors, iron work, etc. A telephone booth

was erected and the telephone equipment installed to conform with the standard employed on the other systems. A three-phase horn-gap air-break, 22,000-volt disconnecting switch was erected in the Beaverton tap, near the junction, for sectionalizing purposes.

A small barn was erected at the power house to house the transportation equipment; also a small building to serve as a machine shop for maintenance repairs. Further storage space for stock was obtained by laying a floor over a part of the gate house.

Wasdell's System

Municipality.	Load in H.P. Oct., 1916	Load in H.P. Oct., 1917	Increase in H.P.
Beaverton	56.3	60.3	4
Brechin	36.2	53.6	17.4
Cannington	57.6	68.4	10.8
Sunderland	52.2	41.5	.....
Woodville	48.2	51.2	3

Wasdell's System

Operating Statement, Fiscal Year 1916-17.

Capital Investment as at October 31, 1917:

Wasdell Power Development and Generating Plant	$139,912 96
Distributing Stations	14,519 90
Transmission Lines	110,298 41
Total Operating Capital	$264,731 27

Total Expenditures in connection with the Operation and Maintenance of the Wasdell System for the fiscal year 1916-17:

Operators' and Patrolmen's Salaries and Expenses, and proportion of Administration and General Office Expense	$7,372 03
Interest on Capital Investment	11,085 45
	$18,457 48

Summary of Financial Statement of the Wasdell System Operation for the fiscal year 1916-17:

Receipts

Power delivered, including charges for Administration, General Expense, Operation, Maintenance and Interest	$28,008 48

Disbursements

Operation Maintenance, Administration, General Office Expense and Interest	18,457 48
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$9,551 00

CENTRAL ONTARIO SYSTEM

During the past year the load on the Central Ontario System has steadily increased until in October it reached the highest peak in the history of its operation.

Extremely favourable river flow continued on the Trent River, enabling all loads to be carried without difficulty. Practically no serious interruptions occurred during the year. Probably the worst interruption was on April 6th, which was due to a snow and sleet storm, which so heavily loaded the wires that a large number of breaks were made, and service was disorganized to all towns at any distance from the generating plants.

Fortunately this trouble occurred on Good Friday, so that factories depending on the Commission's service did not suffer to any great extent.

A number of extensions have been made in the Commission's plants at various places, more particularly in the nature of refinement and improvements to the system, to enable the increasing difficulties of operation under war conditions to be met.

Power Generated

Month	1916 Peak Load H.P.	1917 Peak Load H.P.	Increase H.P.
November	17,800	20,800	300
December	18,150	21,700	3,550
January	16,150	21,500	5,350
February	13,720	18,600	4,880
March	13,750	19,320	5,570
April	12,630	17,500	4,870
May	12,620	17,400	4,780
June	15,330	17,210	1,880
July	15,580	18,200	2,620
August	15,820	20,200	4,380
September	16,480	21,500	5,020
October	18,570	24,440	5,870

Load Report

Municipality	Load in H.P. October, 1916	Load in H.P. October, 1917	Increase H.P.
Bowmanville	1,247	1,140	107*
Belleville	1,434	1,513	79
Brighton	72	90	18
Cobourg	502	522	20
Colborne	75	80	5
Deseronto	302	355	53
Lindsay	1,062	1,540	478
Millbrook	38	31	7*
Napanee	315	275	40*
Newcastle	20	24	4
Newburgh and Camden East	.....	295	295
Oshawa	1,568	1,815	247
Orono	20	24	4
Peterboro	3,067	4,020	953
Port Hope	375	435	60
Stirling	75	80	5
Trenton	670	4,800	4,130
Tweed	87	127	40
Whitby	217	260	43

*Decrease.

MUSKOKA SYSTEM

During the second year's operation of the Muskoka System, the Commission was able to improve the service supplied its customers very materially by further improvements of the equipment in the generating station.

It was deemed advisable to completely re-wind the armature of the old 450-K.V.A. generator formerly in operation at the power house. A gate house was erected and repairs and alterations were made to the gate and stop log operating mechanism. The necessary transformers, heaters and wire were purchased and installed for the purpose of heating the gate house.

The section of the 6,600-volt line to Gravenhurst between the power house and limits of Muskoka Falls village was remodelled and a lighting system, for the power house roadway, pipe lines and dam was erected on the poles of this feeder from the power house to the gate house. This work also included alterations to the distribution system for the village.

Two sets of line disconnecting switches were installed at Bracebridge and Utterson in the 22,000-volt line from the power house to Huntsville, for sectionalizing purposes. The line maintenance gang did considerable tree trimming and made all necessary line adjustments.

Muskoka System

Municipality	Load in H.P. Oct., 1916	Load in H.P. Oct., 1917	Increase in H.P.
Gravenhurst	235	321.7	86.7
Huntsville	580	597.8	17.8

Muskoka System

Operating Statement, Fiscal Year 1916-17.

Capital Investment as at October 31, 1917:	
South Falls Power Development and Generating Plant	$127,106 43
Distributing Station	8,916 35
Transmission Line	53,203 77
Total Operating Capital	$189,226 55
Total Expenditures in connection with the Operation and Maintenance of the Muskoka System for the fiscal year 1916-17:	
Operators' and Patrolmen's Salaries and Expenses, and proportion of Administration and General Office Expenses	8,383 03
Interest on Capital Investment	8,368 67
	$16,751 70
Summary of Financial Statement of the Muskoka Operation for the fiscal year 1916-17:	
Receipts	
Power delivered, including charges for Administration, General Expense, Operation, Maintenance and Interest	$19,815 27
Disbursements	
Operation, Maintenance, Administration, General Office Expense and Interest	16,751 70
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$3,063 57

ST. LAWRENCE SYSTEM

The operation of the St. Lawrence System was attended with very satisfactory progress. The municipal power demands show material increases. Parallel operation of the Municipal steam plant at Brockville with the M. F. Beach Company's hydraulic plant at Iroquois was continued throughout the year with good results. The Commission has proceeded with arrangements for the supply of a sufficient quantity of power to meet the requirements of the system for some years to come.

The transformer stations and the transmission lines required no special maintenance during the year. One of the Pittsburgh Company's 26,400-volt, 250-K.V.A. transformers which was taken over from the New York and Ontario Power Company in a damaged condition, when the sub-station at Iroquois was purchased, was rebuilt and placed in operation.

St. Lawrence System

Municipality.	Load in H.P. Oct., 1916	Load in H.P. Oct., 1916	Increase in H.P.
Brockville	348.5	368.5	20
Prescott	217	191.3	.....
Winchester	58.9	69.7	10.8
Chesterville	48.2	87.8	39.6
Williamsburg	17.4	21	3.6

St. Lawrence System

OPERATING STATEMENT, FISCAL YEAR 1916-17.

Capital Investment as at October 31, 1917:	
Distributing Stations	$30,009 96
Transmission Lines	147,612 62
Total Operating Capital	$177,622 58
Total Expenditures in connection with the Operation and Maintenance of the St. Lawrence System for the fiscal year 1916-17:	
Operators' and Patrolmen's Salaries and Expenses, including Operating Supplies, and proportion of Administration and General Office Expense	$2,437 79
Interest on Capital Investment	7,570 47
Cost of Power purchased	6,101 90
	$16,110 16
Summary of Financial Statement of the St. Lawrence System Operation for the fiscal year 1916-17:	
Receipts	
Power delivered, including charges for Administration, General Office Expense, Operation, Maintenance and Interest	$20,712 44
Disbursements	
Power purchased, Operation, Maintenance, Administration, General Office Expense and Interest	16,110 16
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$4,602 28

OTTAWA SYSTEM

The total load taken by the Hydro-Electric System of Ottawa for the past year shows an increase of 607 horse-power over that of the year 1916, and very satisfactory progress is reported. The power supplied by the Ottawa and Hull Power and Manufacturing Company was of unusual merit with regard to operating features.

The power supplied to the municipality under the temporary contract, since June, 1916, for the operation of the Queen street pumping station will be discontinued very shortly, when the new pumping station at Lemieux Island is placed in service. This station is now ready for test and will be put into regular operation in the middle of November and will require approximately 1,700 horse-power. The new pumping station is fed direct from the power company's generating station *via* submarine cable at 11,000 volts.

In order to supply the additional power required by the waterworks department, the Commission has placed an order with the Power Company under the original contract, for three blocks of 500 horse-power each, making a total on order of 6,500 horse-power. The Power Company has accepted the Commission's order and has agreed to the cancellation of the temporary contract for the Queen street pumping station power supply, this contract to automatically expire on the date that the Lemieux Island plant is placed in regular operation.

The Commission has completed arrangements for the installation of the necessary metering equipment at the Power Company's generating station to provide totalizing graphic records of the power delivered to the municipal electric department and to the new waterworks station and also to provide a separate record of the load taken by the latter station.

PORT ARTHUR SYSTEM

The past year's operation of the Port Arthur System was very satisfactory. The recovery of industrial undertakings and business expansion has shown a marked effect on the power demand, with the result that the Commission will find it necessary to provide several additional blocks of power from the Kaministiquia Power Company to cope with the situation in the coming winter. From a recent survey of the industrial prospects in this vicinity it is estimated that the peak load demand of the City of Port Arthur will approximate 10,000 horse-power within the next few years.

The Commission received first-class service from the Kaministiquia Power Company during the year and the joint operation of the Commission's system with the municipality's Current River station was carried out very successfully.

During the year the Commission proceeded with the erection of a wood-pole entrance and switching structure for the purpose of sectionalizing the two 22,000-volt outgoing lines to the grain elevators and to the waterworks station, thereby greatly benefiting the operating facilities of the high-tension portion of the system.

Port Arthur System

OPERATING STATEMENT, FISCAL YEAR 1916-17.

Capital Investment as at October 31, 1917:

Transmission Lines	$88,118 72
Transformer Stations	21,319 45
Total Operating Capital	$109,438 17

Total Expenditures in connection with the Operation and Maintenance of the Port Arthur System for the fiscal year 1916-17:

Operators' Salaries and Expenses, including Operating Supplies, and proportion of Administration and General Office Expense	$6,691 30
Interest on Capital Investment	6,012 19
Cost of Power	38,487 63
	$51,191 12

Summary of Financial Statement of the Port Arthur System Operation for the fiscal year 1916-17:

Receipts

Power delivered, including charges for Administration, General Expense, Operation, Maintenance and Interest	$56,468 28

Disbursements

Power purchased, Operation, Maintenance, Administration, General Office Expense and Interest	51,191 12
Surplus applicable to Sinking Fund and Depreciation Reserve Account	$5,277 16

TOTAL CAPITAL INVESTMENT TO OCTOBER 31, 1917

Following is a statement of expenditures on Capital Account, including Niagara, Severn, St. Lawrence, Wasdell, Eugenia, Muskoka, Port Arthur, Renfrew, Ottawa, Central Ontario, and Ontario Power Co. Systems, Central Construction Rural, Miscellaneous Power Development, Farms Account, Stock on Hand, Tools and Equipment, Municipal Construction.

Niagara System

Transmission Lines Operating:		
Right-of-Way	$1,115,779 81	
Steel Tower Lines	3,317,432 39	
Telephone Lines	129,706 69	
Relay System Lines	54,537 32	
Wood Pole Lines	2,077,156 36	
		$6,694,612 57
Transmission Lines, in course of construction:		
Right-of-Way (Dundas-Toronto)	$208,545 04	
Steel Tower Lines	480,167 90	
Telephone Line (Section A)	2,970 82	
Wood Pole Lines	200,170 19	
		891,853 95
Rural Line Construction	$481,013 85	
		481,013 85
Transformer Stations:		
Stations Operating	$2,994,107 55	
Conduit System (Ontario Power Co. to Niagara Station)	292,859 75	
Stations and Extensions to same, in course of construction	297,868 48	
		3,584,835 78
Distributing Stations Operating	$267,547 07	
Distributing Stations in course of construction	89,979 80	
		357,526 87
Chippawa Development	$2,376,688 25	
		2,376,688 25
		$14,386,531 27

Severn System

Big Chute Power Development, including Generating and Transformer Stations	$350,713 28	
Big Chute Power Development Extensions in course of construction	10,791 77	
		$361,505 05
Transmission Lines	$348,520 12	
Transmission Lines in course of construction	59,294 15	
		407,814 27
Distributing Stations	$82,861 13	
Distributing Stations in course of construction	15,790 91	
		98,652 04
		$867,971 36

Eugenia System

Power Development, including Generating and Transformer Station	$646,856 32	
Power Development Extension, in course of construction	11,496 63	
		$658,352 95
Transmission Lines	$470,718 72	
Transmission Lines, in course of construction	31,940 81	
		502,659 53
Distributing Stations	$72,857 09	
Distributing Stations, in course of construction	37,866 54	
		110,723 63
		$1,271,736 11

Wasdell's System

Power Development, including Generating and Transformer Station	$139,912 96	
Transmission Lines	110,298 41	
Distributing Stations	14,519 90	
		$264,731 27

Muskoka System

South Falls Power Development, including Generating and Transformer Station	$127,106 43	
		$127,106 43
Transmission Lines	$53,203 77	
Transmission Lines Extension, in course of construction	1,013 25	
		54,217 02
Distributing Stations		8,916 35
		$190,239 80

St. Lawrence System

Transmission Lines	$147,612 62	
Transmission Lines, in course of construction	19,805 52	
		$167,418 14
Distributing Stations	$30,009 96	
Distributing Stations, in course of construction	3,882 17	
		33,892 13
Revenue (Renewals Reserve Shortage)		5,924 03
		$207,234 30

Ottawa System

Meter Equipment	$432 39	
		$432 39

Port Arthur System

Transmission Lines	$88,118 72	
Transformer Stations	21,319 45	
		$109,438 17

Renfrew System

Round Lake Storage Dam	$20,389 43	
		$20,389 43

Central Ontario System

Power Development	$4,012,560 56	
Power Development Extension, in course of construction	60,020 66	
		$4,072,581 22
Transmission Lines	$998,848 22	
Transmission Lines, in course of construction	302,557 87	
		1,301,406 09
Transformer Stations	$830,322 73	
Transformer Stations, in course of construction	9,384 27	
		839,707 00
Stores, Tools and Equipment		109,850 90
General Sales		66,987 98
Local Systems Capital Expenditure		3,114,716 30
		$9,505,249 49

Ontario Power Company

Capital Stock	$7,984,000 00	
Current Account	12,617 42	
		$7,996,617 42

General Accounts

Municipal Construction Work repayable	$413,911 04	
Sales to Municipalities	221,523 52	
Bonnechere District Operating Charges	3,701 25	
		$639,135 81

General Accounts (Capitalized)

Office Furniture, Equipment, Stationery, etc.	$80,380 28	
Office Furniture and Equipment, Electrical Inspection Department	3,172 46	
Service Buildings (Storehouses, Laboratory, Garage, Machine Shop, etc.)	250,741 00	
Automobiles and Trucks (depreciated value)	114,179 63	
Administrative Office Building	467,264 16	
Electrical Railway Projects	28,345 45	
Central Rural Line Construction	10,421 39	
Power Development, Monteith District	1,333 00	
Farms Account	1,164 44	
		$957,001 81

Stores, Tools and Equipment

Stores on hand for Construction Purposes and Sale to Municipalities	$453,615 86	
Line Maintenance Stock for all Systems	64,354 29	
		$517,970 15
Operating Departments, Testing and Metering Equipment for all Systems	$4,053 71	
Line and Station Construction Tools and Equipment	5,579 00	
Line and Station Maintenance Tools	8,572 67	
Hydraulic Construction Tools	2,011 01	
First Aid Outfits	79 40	
		$20,295 79
Laboratory Operation (incomplete production orders)	$431 95	
		$431 95
Ontario Government (Sinking Fund)	$221,494 47	
		$221,494 47
Grand Total		$37,176,900 99

PROVINCIAL EXPENDITURES

Fiscal Year 1916-17

Engineering assistance to non-operating municipalities for the gathering of data throughout the Province for statistical purposes; reports on Municipal Operation	$23,839 57	
Municipal estimates for power supply, non-operating Municipalities, and also rate investigations	1,801 88	
Hydrographic surveys, storage surveys, reports and investigations on power sites and stream flow for the Province	41,926 58	
Engineering investigations, surveys and reports on proposed Municipal Electric Railways	37,909 76	
Demonstration at Rural and Urban Fairs	2,045 60	
Administration and general office expenses	11,746 23	
	$119,269 62	
Less:		
Credits:—For engineering services in connection with preliminary survey for the Niagara System High Tension Lines and Stations, office furniture and equipment, together with interest accrued to October 31, 1917, charged to Province former years, but now capitalized in Commission's books	$61,933 15	$57,336 47
Electrical Inspection—Balance of operating expenses for the year, exclusive of capital investment, such as furniture, typewriters, etc., which is carried forward		39,771 48
Special Hydrographic Investigations—Grand River and Lake of the Woods Districts; Reports on Crown Leases, etc., for the Department of Lands and Mines; also inspection of power at Niagara Falls		7,746 21
Expenditures on account of Hydraulic Equipment		1,372 65
		$106,226 81

BALANCE SHEET

OCTOBER 31, 1917

Assets

Sundry Expenditures, per list	$37,176,900 99	
Warrantable Advances	69,510 83	
Unpaid Power Bills, October 31, 1916	451,890 47	
Unpaid Rural Power Bills, October 31, 1916	37,319 53	
Cash on hand	68,651 33	$37,804,273 15

Liabilities

Provincial Treasurer	$17,002,720 91	
" " Central Ontario System	9,900,000 00	
" " Niagara Power Development	1,200,000 00	
Debentures, Ontario Power Co.	7,784,000 00	
" Gravenhurst	45,789 00	
" Streetsville	5,427 97	
Interest	119,553 58	$36,257,491 46

Systems Reserves Applicable to Sinking Fund and Renewals:

Niagara System	$1,050,536 15	
Severn "	98,072 76	
Wasdell "	15,035 09	
St. Lawrence System	14,864 78	
Port Arthur "	28,069 56	
Eugenia "	18,582 07	
Muskoka "	2,151 31	
Central Ontario System Surplus	212,744 60	
		$1,440,056 32

Service Buildings Reserves applicable to Sinking Fund and Renewals:

Storehouse	$70,561 76	
Laboratory	6,433 77	
Machine Shop	6,610 51	
Garage	720 57	
Administration Building	9,482 67	
		93,809 28

Rural Reserves	$8,863 01	
Insurance Fund	3,792 23	
Balance on Cable Reel Account	260 85	
		12,916 09
		$37,804,273 15

SECTION IV

CONSTRUCTION WORK OF THE COMMISSION

NIAGARA SYSTEM

NIAGARA POWER DEVELOPMENT

During 1917 considerable progress has been made in connection with the Chippawa-Queenston development. At the end of 1916 the location of the intake works, canal and power house had been outlined in general form. Options had been obtained and purchase made of a portion of the lands required for right-of-way purposes. Arrangements had also been completed for some of the plant required in the execution of the work. Extensive surveys had also been prosecuted, both in connection with the location of the works and the securing of the necessary properties.

Surveys

During the year just completed, surveys were continued, the final location of most of the work staked on the ground. A number of difficult and complicated land surveys were also made, and engineering parties were placed in residency on those divisions upon which construction work was about to commence.

The centre line of the canal was reinforced with concrete monuments and the line established by precise methods. Check levels, connecting the headworks with the power house, were also run.

A large number of deep well borings were made to establish the profile of the surface of the rock which underlies the earth formation along the greater portion of the district traversed by the canal.

Daily gauge readings of the Niagara River have been taken continuously at Chippawa, Queenston and the power house site during the year.

Construction Railway

For the purpose of constructing the canal and power house and as a means of disposing of excavated material and handling the large amount of construction material and plant required on the work, provision has been made for a double-track, standard gauge, electrically operated railway, which will parallel the line of the canal and extend also to the main disposal site located on the edge of the escarpment at St. Davids. Sidings, yards and loading tracks are provided for at various points.

When it was decided to electrify the eleven-mile double-track construction railway being built at this time in connection with the new Niagara Power Development, the detailed work of choosing satisfactory sub-station equipment, locomotives and designing a suitable type of overhead trolley wire was taken up.

A contract was made with the Canadian General Electric Company for the supply of six 500-k.w. rotary converters, complete with transformers and switching equipment for two sub-stations. Four of the six equipments are insulated for

1,500-volts so that they could be used on the proposed interurban lines if the opportunity offers. The delivery of this equipment is not all that was desired, and the cost is very high when compared with figures for similar equipment purchased before the war. An attempt was made to secure second-hand equipment and to better the delivery and price, but although many plants were investigated, some as far south as the State of Alabama, still it was found impossible to secure satisfactory equipment in this way.

It was found impossible to secure prompt delivery of electric locomotives, as the usual practice of the two large electrical companies in Canada is to purchase them from allied companies in the United States, and the factories there are congested with war work. The Commission prepared designs and finally awarded the contract for twelve bodies and trucks for 60-ton locomotives to the C. E. A. Carr Company, which is having them built at the National Steel Car Company in Hamilton. Six second-hand lots of motors and control apparatus were also secured. These are now being installed on the first locomotives. A contract was given the Canadian Westinghouse Company for the remaining six locomotive equipments, which are also being built for service on the proposed 1,500-volt lines. It was felt that it would be easier to dispose of these locomotives at the completion of the work if they were built to operate on a 1,500-volt system, and in case they are not required on the proposed interurban system.

This installation is probably the largest construction work of its kind ever undertaken by electric power, and it was necessary to deviate from standard electric railway practice in many ways, the most noticeable of which is undoubtedly in the overhead trolley work. It is the intention to have locomotive cranes and other similar equipment moving up and down the track continually, and it was therefore absolutely necessary to keep the overhead wire at one side of the track or else use third-rail construction. The former method was decided upon. This, of course, required special collectors on the locomotives. This is being taken care of by mounting four trolleys on the operating cab, each provided with poles formed in such a way that the wheels will run on a wire seven feet on either side of the centre line of track.

Offices and Utilities

With the idea of centralizing the administration as much as possible, a general office building was erected on the line of the canal to serve as executive headquarters. Nearby is located a dressing station, equipped with all modern appliances, and a large garage for motor transport services.

A complete system of telephone communication has been installed, making use of the Bell system and a local system for inter-departmental calls.

The Commission has purchased a sand-pit for the supplying of sand and gravel necessary for the manufacture of concrete.

Construction

The past season was mainly devoted to the assembling of equipment for excavation, and the building of about fifty structures of a more or less temporary character, including bunk-houses, boarding-camps, sub-stations, powder houses, cement sheds, water tanks, and a central air compressor and electrical distributing station.

A subsidiary site for the disposal of excavation was developed during the summer at the Whirlpool Gorge. Track to the extent of six miles was constructed and ballasted, about one-half of this amount being laid in the main line and one-half in storage yards.

The main storehouse, woodworking, machine, and blacksmith shops, engine house, coal and lumber storage are all located in one yard near the centre of operations and at a point most convenient to the various railways. The yards contain car storage, sorting and unloading tracks and are connected by inter-switching transfers with the Grand Trunk and Michigan Central Railroads.

A few tracks were laid in the vicinity of the location of the forebay to serve the crusher plant and sand storage, and to facilitate the handling of machinery and building material required in the construction of the power house.

A pole line for the distribution of electric power over the whole work has been completed and placed in operation. This line extends from the intake works at Chippawa along the line of the canal to the power house. It also carries the telephone service wires, in addition to the lines used for the distribution of power.

Overhead construction work has been commenced on the construction railway.

Work has also been commenced on the construction of the rock crushing plant for supplying material for concrete ingredients and track ballast, and partial excavation has been made for storage stock piles for the crushed rock and sand.

Permanent Construction

All permanent construction work done to date has been performed in the Whirlpool section.

Two steam shovels have been operating in the canal prism at this point since May 1917. These machines were also used in taking out excavation for the construction railway.

A start was also made on the construction of the concrete bridge to carry the Niagara, St. Catharines and Toronto Railway tracks over our canal.

In all, 170,000 cubic yards of excavation were removed and disposed of in connection with the construction work accomplished during the year.

Generating Station

Additional discussions were carried on with representatives of different electrical manufacturing companies regarding generators, transformers and oil-switches. Preliminary designs of generators and transformers have been submitted and are being carefully considered. Schemes of connections are also being drawn up for consideration.

Montrose Sub-Station

Instructions were received to construct a sub-station near Montrose to furnish power for the construction work on the Niagara Power Development canal.

The equipment will consist of two incoming 12,000-volt lines, an oil switch and protective equipment on each line; two 3-phase, 1,500-kv-a., 25-cycle, 46,000/26,400/13,200/4,000/2,300/575-volt transformers; and switching equipment for six 4,000-volt feeders and three 200-kv-a., 25-cycle, 2,300/575-volt transformers, to supply air compressor motors.

There will also be installed two 500-k.w. 600-volt rotary converters with their transformers and the necessary switching equipment.

The incoming line oil switches and the 4,000-volt oil-switches were purchased from the Canadian Westinghouse Company. The 1,500-kv-a. transformers, the 12,000-volt lightning arresters and the switchboard panels for the 4,000-volt circuits were purchased from Canadian General Electric Company. Weston indicating meters were purchased from A. H. Winter Joyner, Limited. The 200-kv-a. transformers were purchased from the Moloney Electric Company. The rotary converters with their transformers and switching equipment were purchased by the Commission from the Canadian General Electric Company.

Provision will be made for two additional 1,500-kv-a. transformers, three more 200-kv-a. transformers and for two additional rotary converters. All installation work will be done by the Commission.

Whirlpool Sub-Station

Instructions were received to construct a sub-station north of Niagara Falls, Ontario, to furnish power for the construction work on the Niagara Power Development canal.

The equipment will consist of two incoming 12,000-volt lines, with an oil switch and protective equipment on each line; three 3-phase, 1,500-kv-a., 25-cycle, 46,000/26,400/13,200/4,000/2,300/575-volt transformers; switching equipment for six 4,000-volt feeders; and six 200-kv-a., 25-cycle, 2,300/575-volt transformers to supply air compressor motors.

There will also be installed four 500-k.w. 600-volt rotary converters, with their transformer and necessary switching equipment.

The incoming line oil switches and the 4,000-volt oil switches were purchased from the Canadian Westinghouse Company; the 1,500-kv-a. transformers and the 12,000-volt lightning arresters from the Canadian General Electric Company; the Weston indicating meters from A. H. Winter Joyner, Limited; the switchboard panels for 4,000-volt feeders from Northern Electric Company; the 200-kv-a. transformers from the Moloney Electric Company, Limited; the rotary converters with their transformers and switching equipment from the Canadian General Electric Company.

The installation work of the above equipment will be done by the Commission. The building, which is of semi-permanent construction, will be erected as part of the air-compressor station.

Forebay Sub-Station

Instructions covering purchase of three 200-kv-a., single-phase, 25-cycle, 2,300/575-volt transformers for an outdoor sub-station, near the proposed forebay, were received. The order for three such transformers was awarded to Moloney Electric Company, Limited.

STATION CONSTRUCTION

General

Cooling Water Supply for Sub-Station Transformers

An extended study has recently been made looking to improvements in the water supply for the cooling of transformers in the various stations along the 110,000-volt steel tower line. Originally either a well was driven, water was collected in an excavation in the basement, or some such small system was arranged, and has been adequate until recently. Latterly, loads have increased so that it is necessary to give the matter attention and provide adequate cooling water and some reserve system for cooling of these transformers. Work during this year has been undertaken, among others, at Brant, Dundas, Kent, Kitchener and Preston stations. In some cases adequate supplies have been obtained by means of artesian wells, and in others a reserve supply has been secured by making connections to the domestic supply from the municipality which is supplied with power from the substation.

As it is desired to limit the breathing of transformers by sudden and excessive changes of temperature of oil, etc., due to change of load, an examination has been been made of the application of automatic features to pumping or valve equipment so as to control the amount of cooling water supplied to the transformers in such a way that a greater quantity of water will be supplied as the load on the transformers increases.

Ontario Power Company Generating and Transformer Station

At the end of July, an inspection of the generating and transformer station of the Ontario Power Company was made, and conferences held with the engineers of this company regarding additional feeders to the Commission's Niagara Falls Transformer Station.

Hamilton Garage and Storehouse

To provide garage and storage facilities for the maintenance force at Hamilton, a building located at the corner of York and Napier streets in Hamilton was rented by the Commission, and the necessary repairs and alterations to the structure were authorized in August and completed the following month.

NIAGARA FALLS TRANSFORMER STATION

Building Extension

Brief reference is made in the last Report to an extension to this building being constructed by Messrs. Wells & Gray, to provide facilities for handling larger transformers and for increased accommodation.

The extension is constructed to conform to the type of work on the original building, and contains three floors over the section not required as an erection room and repair shop, and has a basement under its entire area.

Sections of the building were partitioned off as offices, and space was provided on the second floor for maintenance stores. Work in connection with the construction, with the exception of pouring of the basement floor, which has been held up for electrical considerations, was completed early in the year.

In addition to this work, it was found necessary to provide additional supports for transformer banks where larger transformers were being installed. This work was carried out in consecutive order as installation of larger transformers demanded.

Additional Transformer Equipment

No. 8 Bank of transformers, consisting of three 7,500-kv-a., 110,000-volt units was placed in service on May 4, 1917. Contracts for three additional banks of the same rating were placed on January 31, 1917, and February 9th with the Canadian Westinghouse Company, the first bank to be placed in service about December 1st and the other two are expected to be placed in service during 1918. One of the present banks of three 3,500-kv-a., 110,000-volt transformers will be moved to a new location in No. 4 pocket, and reconnected for 46,000-volt operation. No. 3 bank of 46,000-volt transformers was placed in service on October 26, 1917. These changes will give a total transformer capacity at Niagara Station of 181,000-kv-a., including two spare 3,500-kv-a. units, one each for 46,000 and 110,000-volt service.

Switching Equipment

A new 12,000-volt bus structure has been built under contract with Messrs. Wells & Gray, of Toronto, and placed in service to take care of the four feeders from the Canadian Niagara Power Company, and also for controlling the 46,000-volt transformers. In this way the 46,000-volt load can be operated from its own 12,000-volt bus and set of feeders and, if necessary, entirely separated from the 110,000-volt system. The switching equipment for this new bus was purchased on contract from the Canadian Westinghouse Company and has been installed. Necessary temporary changes have been made in the switchboard to handle this additional equipment, and the installation of a new complete station switchboard is under consideration.

Necessary oil switches of an improved type, and other necessary switching equipment, have been purchased from the Canadian Westinghouse Company to increase the capacity of the outgoing 110,000-volt lines and also to ensure better service.

New designs for switch structures for Feeders No. 1, 2 and 3, from the Ontario Power Company's plant have been made to take care of a newer type of 12,000-volt oil switches, which are being purchased on contract from the Canadian Westinghouse Company. The construction of this work will be finished in the early part of 1918.

Eight 1,600-ampere, 12,000-volt and eight 800-empere, 12,000-volt, type "C" reactance oil switches were ordered on April 7, 1917, on contract with the Canadian Westinghouse Company. These switches are intended for future feeders, and delivery is to be made during the summer of 1918.

Protection of Service

After a careful study of the application of current-limiting reactors to the 12,000-volt bus to limit the effect of short-circuits, tenders were obtained and contracts were awarded to Metropolitan Engineering Company, Toronto, for six 2,000-ampere, 12,000-volt power limiting reactors, and to the Canadian General Electric Company for three reactors of the same rating. Orders were placed with

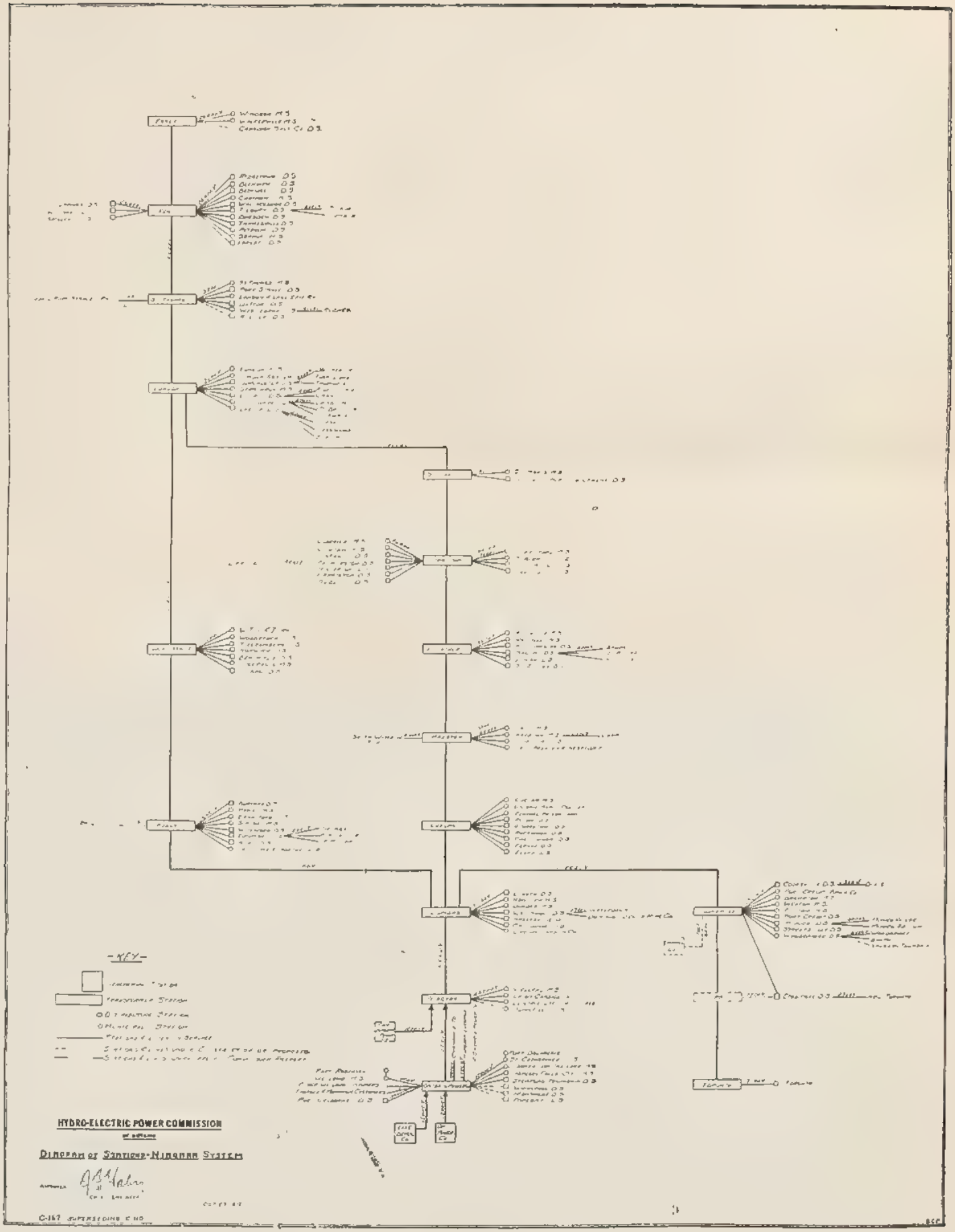

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DIAGRAM OF STATIONS-NIAGARA SYSTEM

the Philadelphia Electric Company and the Canadian Westinghouse Company for necessary switching equipment for these reactors. Contract for the necessary concrete bus structure for this equipment was let to Messrs. Wells & Gray, of Toronto, and part of it has already been constructed. The reactors should be ready for shipment by the end of December 1917.

This work includes the installation of cables so as to form a ring-bus. It is expected to have this work completed in the early part of 1918.

12,000-volt Feeders

The cable system from the Canadian Niagara Power Company's plant, as described in the last Report, is now practically completed. The first feeder was put into temporary service about December 16, 1916. Due to adverse weather conditions this work has not been completed in all details, but will be finished about January 31, 1918. All four feeders, however, are in service; two of them on temporary connections.

A blanket order was placed with the Standard Underground Cable Company of Canada, Hamilton, for 40,000 feet of 350,000-c.m., three-conductor, stranded copper sector-shaped, lead-covered and steel-tape-armored, 12,000-volt cable on April 13, 1917. This cable is intended for additional feeders to the Ontario Power Company's plant, and for other future work.

Work was started on No. 12 feeder to Ontario Power Company, which consists of four 350,000-c.m. lead-covered armored cables and which was supplied by the Standard Underground Cable Company of Canada, on the above blanket order. This feeder will be ready to be placed into service about December 1, 1917.

Plans were finished for reinforcing No. 1 cable system from the Ontario Power Company, covering the addition of one cable to each of the existing feeders, excepting No. 1 feeder, which will be changed over to four 350,000-c.m. cables. This work will be finished early in 1918.

When the above work is finished there will be sufficient cable capacity to meet the added transformer capacity of this station, with a spare feeder in reserve.

Studies are being made in connection with the rearrangement of the incoming feeders so as to obtain improved conditions.

Water and Oil Systems

No. 3 sprinkling tank, referred to in last Report, was placed in service on June 15, 1917. New water supply headers and discharge-headers were installed, with each transformer connected so that it can be supplied with cooling water by any of the three pumps from any one of the three tanks. Plans are being prepared for the installation of a circulating pump between No. 2 and No. 3 sprinkling tanks, so as to make the cooling system more efficient during summer months. All the oil and water piping for the 46,000-volt transformers was moved to a new location back of the transformers. This change was necessitated because the space originally occupied by the piping was needed to accommodate the switching equipment.

An 8,000-gallon oil tank has been ordered and is being installed outside the station. This is to take care of the new 7,500-kv-a. transformer units.

Mechanical Equipment

A 65-ton transfer truck was ordered from the Northern Crane Works, Walkerville, to facilitate the moving of the new 7,500-kv-a. transformers. An 8-ton

chain-block was also purchased for handling the reactors and for general use around the station.

Storehouse

A galvanized iron storehouse, 80 by 30 feet, was constructed immediately east of the Transformer Station to store material used in construction and maintenance work.

General

A bunk house was designed and is being constructed to the east of the Niagara Station for the use of the military guard. Plans are being developed for a proposed extension to the Transformer Station, to take care of a double bus on the 110,000-volt system. Plans for the installation of new neutral resistance are also under consideration.

DUNDAS TRANSFORMER STATION

Reconstruction

The contract for reconstruction of the section of this building which was destroyed by fire, was placed with Messrs. Wells and Gray, of Toronto, and reconstruction to replace original work was started November 1916, and completed early in the spring.

The section of the building which was destroyed was originally constructed by Messrs. Wells & Gray as an extension to the original building in 1913, and was 91 feet long by 45 feet wide by 46 feet 9 inches high, from basement floor to top of parapet wall.

Structural steel, with the exception of some sections which were not damaged by the fire, was ordered as an exact duplicate of the original steel, and was supplied by the Hamilton Bridge Works Company, from the company's original details.

Other work done at this station during the year includes changes to control room in the original building.

The work in connection with repairs to the electrical equipment damaged by the fire was taken care of by the Commission and assistance was given on the factory inspection of some of the repaired apparatus.

New Line Oil Switches

To provide an improved type of oil switch with greater capacity on the four 110,000-volt lines from Niagara Falls, it was decided to replace the original switches, which had been repaired after the fire, with 400-amp. round tank, reactance type "GA," 110,000-volt oil switches, which were being manufactured on contract with Canadian Westinghouse Company for the Niagara Falls Transformer Station, it having been decided to use resistance type oil switches at Niagara Falls. These reactance type switches are nearing completion at the factory and plans are under consideration covering their installation in Dundas Transformer Station.

Increased Transformer Capacity

Owing to the increasing load on this station larger transformers were necessary, and the decision was made in July to transfer three 2,500-kv-a. units from Toronto Transformer Station to Dundas Transformer Station as quickly as they could be released, and to house them in a temporary extension to the existing building. For this purpose a type "K-15," 110,000-volt Canadian General Electric oil switch, ordered on a stock order, was allotted to this station and this has been delivered.

Before the above-mentioned extension was started the plans were altered and decision made to take seven 2,500-kv-a. units from the Toronto Transformer Station instead of three, and to install six of them in the space occupied by the six existing 1,250-kv-a. units, and also to postpone the construction of the extension to the building until further consideration had been given to the question of additional 13,200-volt and 110,000-volt switching equipment for more lines.

Arrangements were made for the moving of the 2,500-kv-a. transformers to Dundas and for the removal of the 1,250-kv-a. units from service, and plans are being prepared to cover the changes in the station.

Cooling Water Supply

Tenders have been received and contract forms arranged for a well about 12 feet internal diameter with concrete walls carried to grade at a point about 25 feet from the south-west corner of the station. The preliminary work, i.e., the excavation to water about 8 feet below grade, has been made.

TORONTO TRANSFORMER STATION

No. 5 Transformer Bank

On June 17th two Canadian General Electric 5,000-kv-a., 63,500-volt high tension, 13,200-volt low tension, 25-cycle, oil-insulated, water-cooled, single-phase transformers, together with the 110,000-volt and 13,200-volt switching equipment for connecting the transformers to the existing busses, were placed in service as part of No. 5 bank, with the spare 2,500-kv-a. transformer forming the third transformer of this bank. On August 19th the third 5,000-kv-a. transformer was placed in service in this bank in place of the above 2,500-kv-a. transformer, making a total capacity of 15,000-kv-a. for this No. 5 bank.

Changes to Transformer Banks No. 3 and No. 4

The contract was placed with the Canadian General Electric Company on January 10th for the necessary 13,200-volt switching equipment and connecting material to change or replace the existing equipment, in order to give sufficient capacity to control the six 5,000-kv-a. transformers referred to in last report as having been ordered for No. 3 and No. 4 banks.

Changes to Transformer Banks No. 1 and No. 2

On February 6th a contract was placed with the Canadian General Electric Company for six 5,000-kv-a., 63,500-volt high tension, 13,200-volt low tension, 25-cycle, oil-insulated, water-cooled, single-phase, transformers. These transformers will be used to replace the existing 2,500-kv-a. transformers in banks No. 1 and No. 2. When these are installed the total capacity of this station will be 75,000-kv-a. A contract was also placed with the Canadian General Electric Company for the necessary 13,200-volt switching equipment and connecting material to change or replace the existing equipment, in order to give sufficient capacity to control these 5,000-kv-a. transformers.

It was decided to install in transformer pockets No. 1 and No. 2 the 5,000-kv-a. transformers which were purchased for pockets No. 3 and No. 4. For transformer bank No. 1 the changes in switching equipment were completed and the first 2,500-kv-a. transformer was replaced on October 18, 1917. The changes will be completed early in November, thus increasing the capacity of this No. 1 bank from 7,500-kv-a. to 15,000-kv-a. The 2,500-kv-a. units will be transferred to Dundas Transformer Station.

In order to accommodate the north transformer in this No. 1 bank, it was necessary to remove the brick wall between this No. 1 bank and the erection room. Arrangements are being made to replace the upper part of this wall with a heavy screen, in order to avoid possible contact between equipment or workmen in the erection room with the high tension and low tension connections for this transformer bank. In order to accommodate the north transformer in bank No. 2 it will also be necessary to remove part of the wall between No. 1 bank and No. 2 bank. A few minor changes in the connections of the oil and water piping to the 5,000-kv-a. transformers were necessary, and same were carried out by Messrs. Sheppard and Abbott, Toronto.

1917 Extension for High Tension Line Switch

On July 25th a contract was placed with Messrs. Witchall & Son, for the construction of an extension on the south end of the building. This extension is 20 feet, 2 inches wide by 18 feet, 9 inches long by 20 feet 8 inches high, inside dimensions, and is made of pressed brick with a concrete foundation to match the present building. Messrs. Witchall & Son supplied all the building material for this extension excepting the structural steel, which was supplied by Messrs. McGregor & McIntyre, Limited. The portion of the transformer station wall which forms the north side of this extension was removed, and a door placed in west wall of lobby as an entrance to this extension. This work is now completed excepting for the concrete bases for the 110,000-volt oil switch. This extension is for the purpose of housing one type "K-15," 110,000-volt oil circuit-breaker, together with the necessary disconnecting switches and line entrances for one 110,000-volt line into this station. This line will be connected through choke coils to one of the present incoming lines. The oil switch, together with its bushing type current transformers, was supplied from a stock order, for which the contract had been placed with Canadian General Electric Company some months previous. The necessary insulators were supplied by the Ohio Brass Company from a stock order which had been previously placed with this firm, while disconnecting switch blades and jaws were supplied by the Canadian Westinghouse Company for mounting on the Ohio Brass Company's insulators by fittings which were supplied by the Commission. The oil switch is now delivered at Toronto Station and the insulators and disconnecting switches are expected during November.

Arrangements are also being made to install disconnecting switches in the 110,000-volt bus between transformer banks No. 4 and No. 5, and between banks No. 2 and No. 3. In order to make these disconnecting switches accessible for operation, an operating platform ten feet high will be installed.

Increased Carrying Capacity of Incoming Lines

To take care of the increased line currents when all the transformers which are on contract for this station are installed, arrangements are being made to supply 400-amp. current carrying parts to replace the existing 200-amp. parts for the Westinghouse type "GA" 110,000-volt oil switches and for all the General Electric 110,000-volt disconnecting switches.

Mechanical Equipment

Owing to the increased weights of the 5,000-kv-a. transformers, it became necessary to strengthen the supports under the crane in the erection room. This work was undertaken by Messrs. McGregor & McIntyre, of Toronto, and completed in December 1916.

The new transformer truck mentioned in last Report was received and used during installation of the larger transformers.

Synchronous Condenser Installation.

On October 6th authorization was given by the Commission for the purchase and installation of synchronous condensers of a total capacity of 8,000-kv-a. Negotiations are proceeding for the purchase of two 4,000-kv-a. units, which it is proposed to install in a separate building to be erected adjacent to the present transformer station, also for the auxiliary equipment necessary for their operation.

PRESTON TRANSFORMER STATION

1916 Extension

The contract for the construction of the extension to the present building referred to in the last Report was awarded to Messrs. John Hayman & Sons, of London, in November 1916, the contract for the steel work being awarded to the Dominion Bridge Company. The building was completed in June 1917. The extension is 34 feet by 56 feet by 36 feet high and matches the original building.

By partitioning off the old service room and putting in a second floor, a control-room and wash-room were made on the main floor, and a service-transformer-room and battery-room on the second floor.

Plans for the required changes in the electrical equipment were completed, provision being made for two 110,000-volt banks of 750-kv-a., single-phase transformers with switching equipment; one 4,000-volt and seven 13,200-volt outgoing feeders and one spare 13,200-volt feeder; also one service transformer feeder. All oil switches are to be electrically controlled from the main switchboard.

The high tension switching equipment for the second bank of transformers, and part of the 13,200-volt equipment is being transferred from Stratford Transformer Station. The 13,200-volt feeder switches will be transferred from Niagara Transformer Station as soon as released from service there. The remaining switching equipment was purchased from the Canadian General Electric Company and Canadian Westinghouse Company.

Four 750-kv-a., 63,500/13,200-volt, single-phase transformers were transferred from Stratford Transformer Station to this station and three of these were placed in service temporarily at 6,600-volts, as a second bank directly in parallel with the first bank on December 24, 1916, the fourth one being a spare to replace one of the original transformers which was transferred to Kitchener Transformer Station. Three 75-kv-a., 13,200/575-volt single-phase Packard Electric Company transformers transferred from Baden Distributing Station, will be used as service transformers, feeding three 7½-kv-a., 550/110-volt, single-phase lighting transformers and station-heating and power circuits. Three 20-kv-a., 13,200/2,200-volt, single-phase Canadian General Electric Company transformers which were transferred from Breslau Distributing Station to a temporary location at Preston Transformer Station on May 6, 1917, to supply a 4,000-volt feeder to Breslau, will eventually be placed in the service-transformer-room mentioned above. A 60-cell "E9" Tudor storage battery and 7-kw., 125-volt, d.c. motor generator set for charging the battery, were purchased from the Canadian General Electric Company, and will supply the necessary current for switch-control-circuits.

All installation work on the switching equipment will be done by the Commission. This work is not yet completed, as it was delayed by pressure of work in other stations, and on account of inability to obtain prompt delivery of equipment ordered.

Cooling Water Supply

By drilling an 8-inch hole approximately 130 feet deep, a flowing well has been secured for this station. This well has been connected to the existing circulating pumps in the basement.

KITCHENER TRANSFORMER STATION

Cooling Water Supply

A well about 26 feet from the north wall of the station has been drilled to a depth of about 160 feet. A motor operated deep well pump will be placed in a sub-grade pump house directly over the well. The motor in this case is wound rotor type. At full load speed the pump will have a capacity of 97 Imperial g.p.m. It is the intention to automatically control the speed by means of a thermostat immersed in the transformer oil. The pump and motor have been ordered and the automatic control apparatus is being investigated. An emergency connection to the city mains has been laid out and tenders for the work have been secured.

STRATFORD TRANSFORMER STATION

Early in this year the four 750-kv-a., 63,500/13,200-volt transformers were transferred from this station to Preston Transformer Station, and arrangements are now being made to also remove the 110,000-volt switching equipment for this bank of transformers to Preston Transformer Station for use there.

In order to have all feeders out of this station operate at 26,400-volts, as referred to in the last Report, it was necessary to supply new service transformers. For this purpose a contract was placed with the Canadian General Electric Company on June 29th for two 75-kv-a., 26,400 or 13,200-volt delta high tension, 4,000-volt star or 2,300 or 575-volt low tension, 25-cycle, oil-insulated, self-cooled, 3-phase, outdoor type transformers. Shipment of these transformers was promised for the end of October. These transformers are to be connected for 575-volts on the low tension from which the electric heating circuits for the station will be taken, and three 5-kw., 550/110-volt service transformers will be used for the lighting, water pumps, etc. Arrangements are being made to install one additional 26,400-volt feeder in this station. At present all the oil switches in this station are hand operated, and plans are now under consideration for the electric operation of all the existing 26,400-volt and 110,000-volt oil switches, and also the moving of the existing switchboard to the service room. It is expected that this station will be changed over to 26,400-volts on the outgoing feeders early in 1918.

ST. THOMAS TRANSFORMER STATION

Railway Equipment

The observation of the operation of the 1,500-volt direct current rotary converters was continued. To afford additional protection, two direct current electrolytic lighting arresters were purchased from Canadian General Electric Company and connected directly across the commutators of the two 500-k.w. rotary converters.

Owing to the load carried by the rotary converters at this station, it was deemed necessary to add a third unit, and plans were prepared showing this additional equipment. One Canadian Westinghouse Company 500-k.w., 1,500-volt direct current rotary converter with a bank of three 185-kv-a., 13,200/920-volt transformers and switching equipment in the Horton street Sub-station of London

Public Utilities Commission were purchased from the London Utilities Commission and removed to St. Thomas Station, being installed there as unit No. 3. The necessary additional switching equipment was purchased from the Canadian Westinghouse Company. The removal of apparatus from London and the erection and installation of it, with the other equipment was done by the Commission. This No. 3 unit was put in service on June 27, 1917.

Additional Feeder Equipment

The installation of the two additional 13,200-volt feeders mentioned in the last year's Report, has not yet been entirely completed, owing to part of the equipment ordered being temporarily used for some more urgent work.

Rotary Converters

The Canadian Westinghouse Company 500-k.w., 1,500-volt rotary converter No. 2, with its switching equipment, three 185-kv-a., 13,200-volt high tension, 920-volt low tension, 25-cycle, single-phase, transformers, and one 1,500-volt electrolytic arrester were purchased from the London Public Utilities Commission and removed by the Commission to the St. Thomas Transformer Station in June.

COOKSVILLE TRANSFORMER STATION

The Commission has purchased from the Toronto Hydro-Electric System a 25-60-cycle frequency changer set of 1,000-kv-a. rating, 12,500-volts, 3-phase, 300 revolutions perminute, built by the Lancashire Dynamo and Motor Company, formerly in operation in a sub-station at Mavety street, Toronto. This machine was dismantled and removed to Cooksville Transformer Station, and is being installed in a corrugated sheet steel annex 33 feet by 28 feet in size.

The set consists of the 1,000-kv-a., 25-cycle and 60-cycle synchronous machines, an exciter and a 2,200-volt starting induction motor, all directly mounted upon the same shaft.

The switchboard, switching and metering equipment, which was originally installed with this set in West Toronto in 1913, was built by the Ferranti Electric Company and was removed to Cooksville also.

The three 50-kv-a., 13,200/2,200-volt Siemen's transformers were transferred from the old Beachville Distributing Station and are being installed in the annex to supply the starting motor.

Power is to be taken from a 13,200-volt, 60-cycle line from the former Erindale Power Company's station, now owned by the Commission, and fed into Niagara System at 25-cycles through this set to the Cooksville Transformer Station 13,200-volt bus.

When not being used as a frequency changer, the 25-cycle end of the machine may be used as a synchronous condenser, on the Niagara System for power factor correction.

The erection of the annex and the installation work on the electrical equipment is being done by the Commission.

BRANT TRANSFORMER STATION

It was decided to remodel the existing 26,400-volt oil switches in this station by putting on heavier tanks, and orders for the necessary parts were placed in March and April with the Canadian Westinghouse Company. Further consideration of the oil switches in this station led to the decision to change them to elec-

trical operation and to install a storage battery and charging set for this purpose. The necessary parts for electrical operation of the 26,400-volt and 110,000-volt switches were ordered from the Canadian Westinghouse Company in April and June. An Edison storage battery type "G-6" was ordered in June from the Edison Storage Battery Company. The 10-k.w., 125-volt direct current generator directly connected to a 15-h.p., 220-volt induction motor, was ordered from the Canadian Crocker-Wheeler Company in August.

Plans are now being prepared for the necessary switchboard for the battery and also for adding differential relay protection to the 1,250-kv-a., 63,500/26,400-volt transformers.

The extension for a second 110,000-volt line, referred to in the last Report, has been postponed.

Cooling Water Supply

The old reciprocating pump has been removed and has been replaced by a motor operated deep well pump rated at 27 Imperial g.p.m. The matter of increasing the water supply is receiving attention.

KENT TRANSFORMER STATION

Cooling Water Supply

It was decided to discard the compressed air method of supplying water to the cooling pond and to install a 3-h.p. motor driven deep well pump having a capacity of 27 Imperial g.p.m. in a subgrade pump house adjacent to the eastern wall of the station. An emergency connection has also been made to the city main in front of the station. The piping has been interconnected so that the centrifugal pumps can pump either from the cooling pond or the city mains and the deep well pump can pump from the deep well to the transformers or to the cooling pond.

YORK TRANSFORMER STATION

A site was procured on Church street, a short distance north of Mimico, for the erection of this station.

A number of studies were made up on the electrical layout and preliminary building plans prepared. The designs are now being prepared.

The preliminary plans provide for two incoming 110,000-volt lines, two banks of 5,000-kv-a. transformers and six outgoing 26,400-volt or 13,200-volt feeders. Provision is also being made for low tension service transformers and several local 2,300-volt feeders. All oil switches will be electrically operated and controlled from the main switchboard.

MUNICIPAL WORK

During the year engineering assistance in connection with extensions to systems and operation difficulties was given to the following municipalities:—

Bothwell, Blenheim, Burford, Caledonia, Comber, Dresden, Hagersville, Lynden, Pt. Dalhousie, Simcoe, Ridgetown, Thamesville, Tilbury, Waterford, Wyoming, Ayr, Brampton, Drumbo, Dutton, Elmira, Elora, Fergus, Goderich, Harriston, Milverton, Mitchell, New Hamburg, Plattsville, Seaforth, St. George, Thamesford, West Lorne, Woodstock.

Ailsa Craig

The annual report of auditor shows the municipality's local electric distribution system to be in substantial condition. Two farmers are also served from the 4,000-volt feeder.

A contract was secured with the local flour and chopping mill for a 75 h.p. motor, and engineering assistance given in regard to the extensions to serve new customers and also regarding operation.

Aylmer

With reference to the delivery of 4,000-volt power to the municipality at $39 per horse-power per annum, and of the cost of a new distribution system to receive the power, estimates were prepared and submitted to the Water and Light Commission.

Distributing Station

Arrangements having been made to supply the Aylmer Water & Light Commission with power, plans were prepared and material ordered for the sub-station.

In the present waterworks and generating station of the municipality, a bank of 13,200/23,000-volt, single-phase transformers connected delta-star and a switchboard panel will be installed, and switching and metering equipment, all of Siemen's manufacture, is being transferred from the old Beachville distributing station and will be installed here.

In addition a 4,000-volt feeder will supply the municipality of Springfield. For this service a panel, switching and metering equipment is on order from the Canadian Westinghouse Company.

All installation work will be done by the Commission.

Street Lighting

For the new street lighting system which is now being installed in this municipality, the Commission recommended the use of gas-filled incandescent lamps on a multiple circuit. The proposed system will provide 140 units of 100 watts each and 12 units of 350 watts each.

Waterworks

The probable cost of installing a new electrically driven pump for domestic supply with and without automatic attachments, and of two fire pumps, one to be driven by an electric motor and the other by a gasoline engine, was investigated. Estimates were submitted and a recommendation was finally made that an electrically driven domestic pump and a gasoline fire pump should be installed.

The town having approved of this, the necessary specifications were issued and tenders were obtained. An order has been placed with the Storey Pump and Equipment Company of Toronto, for one 4-inch, 2-stage centrifugal pump for domestic supply, direct-connected to an automatically-controlled 20-h.p., 3-phase, 25-cycle, 550-volt, 1,500 r.p.m. induction motor, and an 8-inch, 3-stage, centrifugal fire pump, direct-connected to a 4-cylinder, 6 by 6-inch, 1,500 r.p.m., Van Blerck gasoline engine.

The fire pump will replace one of the present steam fire pumps, and the domestic unit will supply the town's ordinary requirements.

Baden

Distributing Station

The three 75-kv-a., Packard Electric Company transformers in service in this station were transferred to Preston Transformer Station in February, being replaced at that time by three 150-kv-a., 13,200/2,200-volt, 25-cycle, Canadian Crocker Wheeler transformers, purchased from the Municipality of Seaforth. The necessary changes in switching and connecting material were made at the time. All work was done by the Commission, being completed on February 11th.

Beachville

Distributing Station

On account of the increase of the load on the Standard White Lime Company's 2,300-volt feeder, which was approximately two miles in length, it was decided to build a new sub-station with increased transformer capacity, and if possible, to locate this station on a site nearer to the White Lime Company's quarries.

The Commission, therefore, procured a site outside the Beachville Municipality, but close to the quarries, on which a standard type "D.L." distributing station building was erected by Wells & Gray, of Toronto.

The transformers installed, which were transferred from the Embro Distributing Station, are three Canadian General Electric Company, 75-kv-a., 13,200/2,300-volt, single-phase, 25-cycle units.

The switching and metering equipment, which is of Siemen's manufacture, was transferred from the Breslau Distributing Station.

Power is supplied over a 13,200-volt line from Woodstock Transformer Station, and two 2,300-volt outgoing feeders are provided, one to the Standard White Lime Company and the other to the Municipality of Beachville.

The new station was put in operation October 26th.

After being taken out of service, the old Beachville Station was dismantled, the switching and metering equipment, which is also of Siemen's manufacture, was transferred to the new Aylmer Distributing Station and the three 50-kv-a. Siemen's transformers were transferred to Cooksville Transformer Station.

All electrical work was done by the Commission.

Brantford Township

During the year the distribution system in Brantford Township, owned by the Western Counties Electric Company, was purchased by the Township. This system was remodelled and extended under supervision of the Commission. It is expected that power will be turned on early in January 1918.

Breslau

The line from Preston serving Breslau was changed to 4,000 volts and the station transformers moved from Breslau to Preston. This has enabled the Commission to supply energy to various farms en route, and about twenty new customers have been obtained along the line and in Breslau.

Distributing Station

As the load on this station did not require the capacity of the transformers installed, the three 75-kv-a, Westinghouse 13,200/2,300-volt transformers originally installed in this station were removed to Acton Distributing Station by the Commission. They were replaced with three 20-kv-a. Canadian General Electric

13,200/2,300-volt transformers taken from stores. It was later decided not to continue operation of this station. Arrangements have been made to feed the Municipality of Breslau from the Preston Transformer Station. These 20-kv-a. units were transferred, on May 6, 1917, to Preston Transformer Station and the station operation discontinued.

The entire switching equipment in Breslau Distributing Station was transferred to the New Beachville Distributing Station.

Brigden

The construction of a standard outdoor pole-type distributing station was authorized in April to supply power to Brigden. The equipment consists of Hydro-Electric Power Commission standard air-brake switch, Delta-Star fuses, choke coils and arrester, one 50-kv-a., 3-phase, 26,400/13,200/4,000/2,300/575-volt, 25-cycle Moloney Electric Company transformer, and one 4,000-volt feeder protected with expulsion fuses. The metering equipment consists of a Canadian General Electric graphic recording wattmeter with suitable instrument transformers housed in a corrugated metal meter house.

All construction work is being done by the Commission and the station will shortly be placed in operation.

Chatham

The Chatham system power load was considerably increased during the year, partly by munition plants and partly by flour mills, which formerly used steam equipment operated by gas-fired boilers; the gas supply in Western Ontario having failed during the fall of 1917.

Clinton

A more favorable showing has been made in Clinton. This was due to the expiration of old contracts assumed when the Commission turned on power. Additional power has also been requested for the flour mill. The consumers were given a reduction in rates during the year.

Dashwood

Estimates were prepared giving a price of $56.75 per h.p. per annum for 50 h.p., delivered at 4,000 volts.

The Commission designed and supervised the installation of the local distribution system. Assistance was also given regarding a layout for the installation of the local flour and chopping mills 50 h.p. motor.

Power was turned on during the month of August 1917.

Drayton

The enabling and money by-laws were submitted and passed, and a contract entered into with the Commission for 100 h.p. at $60.45 per h.p. per year. Upon the request of the village the Commission valuated the local system, which was owned by the Canadian Flax Mills Company, and assisted in the purchasing of the distribution system. Material for the new system has been ordered and is now being installed. It is expected power will be turned on early in 1918.

Dublin

The distribution system was built and Hydro power turned on in the police village of Dublin during the year. The contract was for 50 h.p. at $47.91 per h.p. per year. There is at present one 20 h.p. motor in addition to the lighting.

Distributing Station

The construction of a standard pole type distributing station was authorized in December. The equipment consists of two Hydro-Electric Power Commission air-brake switches to take care of the two incoming lines Delta-Star fuses and choke coils, one 50-kv-a., 26,400/13,200/4,000/2,300/575, 25-cycle, 3-phase Moloney Electric Company transformers, and one 4,000-volt feeder protected by expulsion fuses.

The metering equipment consists of a Canadian General Electric Company graphic wattmeter with instrument transformers, housed in a corrugated metal meter-house. The construction work was done by the Commission, and the station was placed in service on September 23rd.

Dunnville

A new distribution system and sub-station were constructed in Dunnville during the year, and it is expected that the system will be connected to the Niagara System early in the coming year. Dunnville will be supplied with power from the Welland district at 46,400 volts.

Municipal Station

Following the decision of the Town of Dunnville to purchase power from the Hydro-Electric Power Commission of Ontario, and at the request of the local authorities, plans and specifications were prepared covering a new building approximately 40 feet long by 19 feet wide by 22 feet high, as an extension to the existing power-house, to be constructed of brick with a concrete foundation. Tenders were called for and recommendations made, and on July 4th the contract for the building was placed by the local commission with Mr. Robert Bennett, of Dunnville.

Drawings and specifications were also prepared and tenders requested for three 150-kv-a., 26,400 or 13,200-volt high tension, 2,300 or 575-volt low tension, 25-cycle, oil-insulated, self-cooled, single-phase transformers, and for switching equipment to control one 45,700-volt incoming line, one bank of three 150-kv-a. transformers and one 4,000-volt feeder. At a meeting on January 30th, the Dunnville Public Utilities Commission awarded the contract for the delivery and installation of the transformers to the Canadian General Electric Company, and for the delivery and installation of the switching equipment to the Canadian Westinghouse Company. Two 16-k.w. street-lighting transformers with control panels have been ordered from the Canadian General Electric Company and will be installed by the Commission.

The building is practically completed; the transformers will be installed during November, and the street-lighting transformers with their panels have been shipped, and will be installed at the same time as the main switching equipment, which will be shipped during January 1918.

Embro

Distributing Station

Authorization was obtained to purchase a 50-kv-a., 3-phase, 25-cycle, 13,200/2,300-volt transformer for this station to permit the three 75-kv-a., 13,200/2,300-volt transformers previously installed being transferred to the new Beachville Distributing Station. A 50-kv-a. transformer was therefore ordered from Packard Electric Company, St. Catharines, and was installed and placed in service by the Commission on August 16th. The three 75-kv-a. units were then shipped to Beachville.

Etobicoke Township

The Interurban Electric Company, having gotten into financial difficulties, the portion of the company's plant lying west of the Humber River was taken over and operated by the Commission. Plans were prepared covering the rebuilding of these lines and their connection with systems in various parts of the township which had previously been built by the Commission and operated by adjoining municipalities. The work of rebuilding and extending these lines is now well advanced, and when completed will form the most extensive township system receiving power from the Commission, the lines being over 38 miles in extent and serving some 600 customers.

Temporary Distributing Station

The temporary station referred to in the previous Report was erected on the site obtained for the permanent station on the north-west corner of Birmingham and Ninth streets, New Toronto. This temporary building is a frame structure covered with corrugated iron, and is approximately 36 by 15 feet, and is so located on the lot that it does not interfere with the construction of the permanent station.

Two 13,200-volt lines from Cooksville feed into this station through automatic oil switches, with lightning arresters on each line. A 13,200-volt feeder is taken out through a standard air-break switch, to the Mimico Distributing Station. Three 2,300/volt feeders supply power to Goodyear Rubber Company, Brown's Copper & Brass Rolling Mills, Ltd., and to the Municipality of New Toronto.

Instead of using the 300-kv-a. Johnston and Philips transformers mentioned in previous Report, a contract was placed with the Moloney Electric Company for three 750-kv-a., 3-phase, 26,400/13,200/4,000/2,300-volt transformers on December 6, 1916. Two of these were installed and the station put into operation on June 2, 1917. One of these transformers failed on September 21st, and was replaced by the third one, and the damaged transformer returned to factory for repairs. It is expected that it will be ready for shipment by the first of next year.

The building was erected and electrical equipment installed by the Commission and will be used until the permanent station is ready for service, when it will be dismantled and the apparatus used in other stations.

Permanent Distributing Station

Building plans and specifications were prepared for the construction of a distributing station in New Toronto, and the contract for the building awarded to Witchall & Son, Toronto. The structural steel was ordered separately from McGregor & McIntyre of Toronto.

The building is 73 feet by 32 feet 5½ inches by 43 feet 6½ inches high, above ground level, and is of red pressed brick, with stone trimming and steel sash windows. Special large ventilator windows were placed in the wall back of the transformers, and also special ventilators were built on the roof on account of self-

cooled transformers being used. The building is being erected on the corner of Birmingham and Ninth streets, New Toronto, and will be completed early in January.

The building is designed to accommodate four 1,500-kv-a., 26,400/13,200/4,000/2,300-volt, 3-phase, self-cooled transformers with switching equipment for same and for four incoming 26,400-volt, 3-phase lines, and twelve outgoing 2,300-volt feeders, and service transformer equipment. A transformer erection room is also provided at one end of the building, with crane rails on which a 20-ton chain hoist will for the present be supported on a special frame with provision, later on, for installing a crane.

Plans and specifications were prepared for the switching equipment to control an immediate installation of two incoming 26,400-volt lines with provision for two future lines; two 1,500-kv-a., 3-phase transformers with provision for two future transformers; eight outgoing 2,300-volt feeders; one bus tie and one service transformer feeder, and provision for three future feeders. A double 2,300-volt bus will be provided with selective disconnecting switches permitting any transformer or any feeder to be connected to either bus. All oil switches will be electrically operated and controlled from the main switchboard.

The control room in which the switchboard will be located, the office room and the power transformers will be on the main floor. The low tension switching equipment will be located on the second floor directly above the control room, and the high tension switching equipment will be on the third floor. The battery and motor generator set will be located in the basement, where space is also provided for oil tanks and pumps. A partition in the basement under the transformers forms an air duct for cooling the transformers by forced draft, if found necessary.

The station will be operated at 13,200 volts until the proposed York Transformer Station is put in operation, when it will be changed to 26,400 volts.

Tenders were requested for transformers and the electrical equipment required, and a contract was placed in November 1916, with the Canadian Crocker-Wheeler Company for two 1,500-kv-a., 26,400/13,200/4,000/2,300-volt, 3-phase, 25-cycle, self-cooled transformers to be delivered and erected in the station. The contract for the low tension switching equipment to be installed in the station was awarded to the Canadian General Electric Company, September 4, 1917. They are also to supply the high tension equipment, which, however, will be installed by the Commission. Recording meters were purchased from the Canadian Westinghouse Company and Weston indicating meters from A. H. Winter Joyner Co., of Toronto.

A 100-cell "G-4" Edison storage battery was purchased from the Edison Storage Battery Company, Orange, New Jersey, and the 7½-k.w. motor generator set for charging this battery was purchased from the Canadian Crocker-Wheeler Company of Toronto.

It is expected that this station will be completed early next year.

Exeter

This municipality has made good progress in the short time they have been operating. The local plant is well looked after and the auditor's report showing a good surplus.

The local flour and chopping mill has been electrified, and it is expected that the owners of the salt well will at once place an order for a motor. A large number of lighting customers have been added during the year.

Engineering assistance was given with reference to extensions to the municipal system as well as in its operation.

Distributing Station

The 13,200-volt electrolytic lightning arrester ordered in August, 1916, from the Canadian General Electric Company, was delivered and installed in March.

Hensall Feeder

The panel and equipment for controlling the 4,000-volt feeder to Hensall were installed by the Canadian General Electric Company in January and were placed in service. Power, however, was first delivered to Hensall through temporary connections on December 21st.

Zurich and Dashwood Feeder

The order for an additional panel and equipment for controlling a 4,000-volt feeder to Zurich and Dashwood was given to the Canadian General Electric Company on March 24th, and the installation was completed by the Commission on October 29th. This feeder will be connected into service during November.

Forest

The type "H" station referred to in last Report was completed and placed in service on February 7th.

Galt

The operating conditions with 10,400-volt, 4-wire, 3-phase, power, delivered to the municipality was investigated, and estimates were prepared for the local system's changes, also on the changes at present-day prices to receive 13,200-volt power.

The most suitable location for a new main sub-station was gone into with the local management and the building drawings looked over for the new sub-station. The proposed electrical layout was considered, and a report of the same was made to the management of the Galt Hydro-Electric Commission. It was decided that the local system should not go ahead this year with the erection of a new sub-station.

Assistance was given during the year in matters pertaining to the operation of the local system.

Waterworks

Tests on the two motors and the direct-connected pumps in the Galt Waterworks pumping station were made by the Commission.

Glencoe

An engineer visited the municipality in June and estimates were prepared on a supply of 150 h.p. for the municipality, but as the local flour mill was burned in July the requirements for the municipality were limited to 50 h.p. The municipality was given an estimate on 50 h.p delivered at 4,000 volts.

No further action has been taken by the municipality to secure power from the Commission.

Guelph

During the year engineering assistance has been given the municipality from time to time, notably in arranging for a breakdown connection to the 13,200-volt line to Fergus and in arranging for increased station capacity.

Municipal Station

Engineering assistance was given to the Board of Light and Heat Commissioners of Guelph in connection with the purchase and testing of one 225-kv-a., 13,200-volt delta high-tension, 2,300 or 575-volt delta low-tension, 25-cycle, oil-insulated, self-cooled, 3-phase transformer. The contract was placed on behalf of the above Commission with the Canadian General Electric Company in February, and the transformer has been tested and will be shipped early in November 1917.

In July, at the request of the local Commission, prices were obtained on one 550-kv-a., and one 225-kv-a., 3-phase transformer, and on their instructions, a contract was awarded in August to the Canadian General Electric Company for both transformers, delivery to be in August 1918.

Hamilton

In addition to a large addition in domestic and commercial customers during the year, a very important power load was added in the National Abrasives Company, whose contract amounts to 2,700 h.p. This load will be put into operation early in the coming year if sufficient power is available.

Hensall

This municipality has contracts signed for 112½ h.p., and when this load is all on the municipality will be in good condition. Assistance has been given the local system from time to time in regard to contracts, extensions and operations.

Highgate

The system has shown very satisfactory results for the year, and arrangements are being made to supply the local flour mill with Hydro power.

Hespeler

Assistance was given the local Commission on various matters pertaining to the operation of the local system and on extensions to the same.

At the request of the municipality complete tests were made on the domestic turbine pump and on the fire turbine pump, and a report submitted on this.

The operating conditions with 10,400-volt power, 4-wire, 3-phase, delivered to the municipality and the R. Forbes Company, Limited, was investigated and estimates made regarding the changes to the local system, and the company, also, on changes necessary to receive 13,200-volt power along the lines of present-day prices.

Ingersoll

The load for October this year was 858 h.p. taken at 88 per cent. power factor. During the year the distribution system was rebuilt in certain sections to improve the local conditions.

An overdraft in the bank of $15,000 four years ago has been changed to a surplus of $4,000 without the issue of additional debentures, so that the financial condition of the local system is in excellent condition.

The installation of Ingersoll's White Way was completed in January 1917. It consists of twenty-six ornamental cast iron standards of the pendant type with lamp fixtures equipped with bowl refractors. The 1,000 c.p. gas-filled lamps are of 20-ampere rating and are connected to the 6.6-ampere series circuit through

individual transformers located at each standard. The circuit is carried in lead-covered cable drawn into fibre conduit laid under the concrete sidewalk.

The transformers are buried in the ground beside the ornamental standards and the high voltage, therefore, is confined below the street surface. A 22-k.w. constant-current transformer was purchased to provide extra capacity required in part by the new installation.

Cable and cable terminals were supplied for underground distribution feeders out of the municipal sub-station.

Kitchener

The Hydro Department shows a decided increase in load, and additional equipment has been put in service in order to meet the demand. Requests for about 2,000 additional h.p. have been received during the year.

Listowel

During the year the distribution system has been completed to supply power and lighting customers. The ornamental street light has been extended and an electrically-driven pump installed in the waterworks.

London

The load during the year has increased from 7,359 h.p., taken in October 1916, to 9,142 h.p., taken in October 1917, or an increase of approximately 24 per cent. During the year assistance was given in connection with extensions to the local system and in operation of the same. The local system is taking care of a large cooking load, and the customers are very well pleased with the results and the cost of the electric current for this purpose.

The financial report for the year shows a good condition.

Office Building

Engineering assistance in connection with the plans of the new office building was given to the Public Utilities Commission.

Horton street Station

At the request of the Public Utilities Commission, of London, engineering assistance was given by the Commission in connection with the planning of an extension to this station.

When considering increased capacity for this station, it was decided to rearrange the whole existing equipment and the layout. Instead of buying more transformers, each of the capacity of 250-kv-a., it was decided to buy 1,500-kv-a., 3-phase transformers, and to replace the existing 13,200-volt oil switches and the more important 2,300-volt oil switches with switches having a considerably larger rupturing capacity. In order to accommodate this rearranged switching equipment and the larger transformers, an extension to the building, 30 feet wide by 83 feet long by 30 feet high (approximate inside dimensions), with a basement 83 feet long by 13 feet wide under the low tension switching equipment, is necessary. The transformers, with the switchboard and low tension switches, will be located on the main floor, with the constant current transformers and the potential regulators. The 13,200-volt equipment will be located on the second floor. This new arrangement will include a duplicate 13,200-volt bus. Each feeder to this bus will have one oil switch, with a set of selector disconnecting switches for connecting to either bus. A similar 2,300-volt duplicate bus is also being arranged for. The

waterworks feeders with their present switches and bus will be left in their present location close to the water pumps. The 575-volt feeders will be moved and will be connected to a single bus. This will also be done for the street-lighting feeders. Two 1,500-kv-a., 13,200-volt star high tension, 4,000-volt star or 2,300 or 575-volt delta low tension, 25-cycle, oil-insulated, water-cooled, 3-phase, transformers were ordered from the Canadian General Electric Company in April, and are expected to be delivered during November. These transformers will be installed temporarily in the present station to give the increased capacity required during the winter months.

Specifications have been issued and tenders received covering the new switching equipment required. Work on the building extension will not be started until the spring of 1918.

Lucan

The local commission is taking more power than the contract amount of 100 h.p. For the month of October this municipality received and paid for 142 h.p., delivered at 4,000 volts. Both flour and chopping mills installed electric drive, and engineering assistance was given in the installing of electrical apparatus as well as in extensions to serve the additional customers. Advice was given on operating from time to time throughout the year.

Markham

A request for a supply of Hydro power having been received from the Village of Markham, as well as a number of petitions from Markham Township, an investigation was made as to power requirements in this district and estimates prepared on the cost of delivering this power. As the possibility of supplying power in this district depended on the power requirements of other municipalities, the question of this supply is still undecided.

Mimico

The business in this municipality increased to such an extent that it was found necessary to make many additions and improvements to the distribution system, and the amount of such construction was increased by the taking over of that portion of the Interurban Electric Company's system lying within the town. Engineering assistance was given both in obtaining new power and lighting customers, and in advising as to the proper construction for the necessary lines.

Distributing Station

As the feeder to the municipality of New Toronto and to Brown's Copper & Brass Rolling Mills, Limited, which was fed from the three 150-kv-a., 13,200/2,300-volt Crocker-Wheeler Company transformers located in a temporary extension to this station, was changed over to feed out of Etobicoke Temporary Station when that station was placed in service, it was no longer necessary to operate this bank of transformers. The transformers were therefore cut out of service August 23d, and the temporary extension dismantled, the transformers being transferred and shipped to Niagara Falls for use on the Queenston development work.

Because of excessive voltage drop in the 2,300-volt feeders from this station, it was decided to change the secondary voltage from 2,300-volt delta to 4,000-volt star neutral grounded. The necessary additional apparatus was ordered and the change was made by the Commission on September 2d.

As it was found necessary to still operate the Mimico Asylum and Provincial Brick Company feeder at 2,300-volts, it was disconnected from the station bus and connected on the 2,300-volt New Toronto feeder from the Etobicoke temporary station which was brought into this station for metering purposes.

Mitchell

Municipal Station

The three 75-kv-a., 26,400 or 13,200-volt high tension, 575-volt low tension, 25-cycle, oil-insulated, self-cooled, single-phase Canadian General Electric Company's transformers were installed in a new and separate building. This building is the same as the Commission's standard type "G-1" Station and was built by the Corporation of Mitchell. This station will accommodate two incoming 26,400-volt lines, one set of electrolytic lighting arresters, one set of choke coils, one 26,400-volt hand operated automatic oil switch with its current transformers and the three 75-kv-a. transformers. The low tension circuit from the transformers is taken directly out of the new building and carried over to the existing station and connected to the existing 575-volt bus, where the meter for this station is installed. The 26,400-volt lightning arrester, oil switch and current transformers for this station were taken from a stock order which had been placed by the Commission some months ago with the Canadian General Electric Company. The 26,400-volt insulators, choke coils, disconnnecting switches, etc., were supplied by the Canadian General Electric Company. The equipment in this station is now being installed by the Commission, and should be ready for service about the middle of November.

Moorefield

The enabling and money by-laws were submitted and passed, and material for the distribution system has been ordered. A contract for power was signed with the Commission on a basis of 25 h.p. at $63.93 per h.p. per year. Power will be supplied from Palmerston at 4,000 volts.

New Toronto

Many additional power and lighting customers having been secured, with a consequent increase in the power demand, it was found necessary to make numerous alterations and additions to the distribution system. On request of the municipality the Commission gave the necessary engineering advice, arranged for the purchase of material and supervised the construction which is now completed.

Niagara Falls

Distributing Station

The equipment described under this heading in the last Report will not be required, owing to arrangements having been made so that the City of Niagara Falls and Stamford Township will be supplied with power direct from the Ontario Power Company's Distributing Station. The material purchased for this work is being used elsewhere.

Norwich

The load on the local system has increased from 171.6 h.p. taken during October 1916, to 231 h.p. taken during October 1917. Assistance was given the local management during the year on the operation of the local system and on extensions.

The local condenser company is considering using a block of 200 h.p. during the coming year to take care of extensions to their plant.

Distributing Station

As the load on this station has increased very rapidly, the three 50-kv-a. transformers now in service are inadequate, and arrangements are now being made to install larger transformers.

Oil Springs

Under the supervision of the Commission, a new system was designed and constructed and it is expected that power will be turned on early in 1918.

Distributing Station

The construction of a standard pole-type distributing station was authorized in April to supply power to Oil Springs. The equipment consists of a Hydro-Electric Power Commission air-brake switch, Delta-Star fuses, choke coils and arrester, one 75-kv-a., 3-phase, 26,400/13,200/4,000/2,300/575-volt, 25-cycle transformer and one 4,000-volt feeder protected with expulsion fuses. The metering equipment consists of a Canadian General Electric graphic recording wattmeter with suitable instrument transformers housed in a corrugated metal meter house.

All construction work is being done by the Commission and the station will be ready for service early in November.

Palmerston

Waterworks

In last year's report mention was made of the fact that a vertical, electrically driven, centrifugal pump had been ordered, and that this pump had been tested at the maker's works.

This pump is installed in a well about 6 feet in diameter and 35 feet deep, and although a good deal of trouble was experienced in getting the steel caisson into place, owing to the presence of quicksand, it was finally accomplished quite satisfactorily. The whole installation has worked very well ever since it was put into service, in March of this year, and has been the means of saving the town a very considerable annual expenditure on coal as well as the wages of one man.

As a precaution against seepage, in order to keep the caisson dry, a small plunger pump, driven by a 1-h.p. electric motor, has been installed in the caisson; this is only operated occasionally.

The caisson is electrically lighted, and a small brick building has been erected over the top of it.

Distributing Station

On August 24th a contract was placed with the Canadian General Electric Company for the supply and installation of one 3-phase, 4,000-volt feeder-panel, including switching equipment and connecting material for one out-going feeder to Drayton. This equipment is due for shipment early in 1918.

Paris

The use of electric power in this municipality has greatly increased, and during the last month of the year they purchased 1,125.1 h.p. For the same month a year previous their load was 398 h.p.

An additional 75 h.p. contract has been signed with the Wincey Mills. The power is to be delivered next spring when the textile machinery for the mill is expected to arrive from England.

Engineering advice was also given the municipality regarding the installation of a new 25-cycle, booster fire pump.

When conditions become normal the local commission expects to have removed the communication poles of companies, as well as its own in business section of the main street, and to improve the business district lighting with an ornamental street lighting system.

Municipal Station

The three 150-kv-a. transformers and other equipment, referred to in last Report, were installed and connected into service on November 24th.

Parkhill

Estimates were prepared for 50 and 75 h.p. to be delivered to the municipality at 4,000 volts.

The Commission investigated conditions in the municipality and gave advice in regard to the operation of a local Hydro-Electric System. All the available power users were convassed, and contracts signed for two years for the local system.

The municipality finally decided to contract for 75 h.p. at $75.23 per h.p. per year. Assistance was given the municipality in the preparation of its money by-law.

A vote will be taken on the money by-law in November.

Petrolia

During the year a great increase occurred in the number of power consumers, due to the majority of oil pumping rigs changing over to the use of Hydro power. A considerable increase in the production of the wells was noted, due to the steady running of the motors.

Sandwich

During the year a contract was signed with this Commission for a supply of power for the Canadian Salt Company's Sandwich plant. The amount of power to be supplied under the contract is 2,000 h.p., and engineering assistance was given the company in connection with the purchase of rotary converters and in connection with the erection of a 26,000-volt sub-station. It is expected that the equipment will be put into operation early in the coming year, if power is available. The power is used in connection with the electrolysis of salt brine, the products obtained being used at the present time entirely in connection with the manufacture of high explosives.

Canadian Salt Company Distributing Station

Drawings and specifications for a sub-station to supply power for two 2,000-kv-a. rotary converters were prepared.

It was decided to install transformer capacity sufficient for one rotary converter at present, with provision for duplicating the equipment as soon as the output of both rotary converters is needed.

A contract was therefore placed with the Moloney Electric Company in March for three 750-kv-a., 26,400/176-volt, 25-cycle, single-phase, water-cooled transformers.

A reinforced concrete building 60 feet by 22 feet in size was erected by the company in accordance with the Commission's plans and specifications.

Switchboard panels were purchased from A. H. Winter Joyner, Limited, and switching, metering and control apparatus from the Canadian General Electric Company and the Canadian Westinghouse Company.

As soon as the equipment is delivered, it will be installed by the Commission and put into service as speedily as possible.

Power will be supplied over two 26,400-volt lines from Essex Transformer Station.

Sarnia

During the year engineering assistance was given to Sarnia in connection with the completion of work in connection with remodelling the distribution system, and also in the construction of a 26,000-volt sub-station.

The 60-cycle, steam-driven equipment in the station, purchased together with the distribution system from the Sarnia Gas and Electric Light Company, was disposed of at very satisfactory figures, and the Sarnia system has shown a very satisfactory operating result for the year.

Street Lighting

The new street lighting system noted in the preceding report as being in course of construction, has been completed and placed in service. The residential fixtures are of the latest type with reflectors designed for use with the concentrated-filament of the gas-filled incandescent lamp. The White Way fixtures are of the bracket type, with diffusing globes, and are mounted on steel poles, which carry the single overhead wire of the series-circuit, and which also support the span wires of the street railway system. On these poles are also mounted the individual transformers for the lamps. These transformers are rated at .516-k.w. 6.6-ampere primary and 20-ampere secondary. The poles are spaced at approximately 105 feet with lamps on all poles, on both sides of the street, in the business district.

Municipal Station

Two of the 750-kv-a., 3-phase transformers were placed in service on November 10th, with one 26,400-volt oil switch loaned from Essex Transformer Station, and some 26,400-volt disconnecting switches from the Canadian General Electric Company, all as referred to in the last Report. The installation of the permanent equipment has been practically completed for the two 26,400-volt incoming lines, three 750-kv-a. transformers, four 28-k.w. constant current street lighting transformers, one 75-kv-a. potential regulator, four 4,000-volt commercial lighting feeders, four 4,000-volt power feeders, etc., all as referred to in the last Report.

In March, the Canadian General Electric Company was not in a position to ship the 410-kv-a. synchronous motor, and arrangements were made for them to express on loan from Peterboro, one 500-k.w. rotary converter which they had available. This rotary converter was connected through six 25-kv-a., 550-volts high tension, 220/110-volts low tension, single-phase transformers to the 575-volt taps on one of the 750-kv-a., 26,400-volt high tension transformers, and rotary was placed in service about April 1st. It was essential to supply this service from 25-cycle power, in order to release one of the steam turbines for use in a munition plant. The 410-kv-a. synchronous motor was placed in service on September 28th.

On September 26th, the contract was placed with the Canadian Westinghouse Company on behalf of the Sarnia Hydro-Electric System for three 185-kv-a.,

2,300-volts high tension, 25-cycle, oil-insulated, self-cooled, single-phase transformers, suitable for operation in a bank with the high tension star connected for 4,000-volt grounded neutral service, and with the low tension double-delta connected to operate satisfactorily with a 500-k.w., 600-volt rotary converter, which is being supplied by the Canadian Westinghouse Company to the Sarnia Street Railway Company, but which will be installed in this station. These transformers are due for shipment in February 1918.

Scarborough Township

During the year the township entered into an agreement with the Commission for a supply of electrical energy. The Commission drew up plans and specifications for an extensive distribution system in the south-western and central portions of the township, including a street lighting system along Kingston road and vicinity. Instructions have been issued for the building of these lines, and it is expected that they will be completed about the middle of the coming year.

Seaforth

Municipal Station

The three 150-kv-a., 26,400 or 13,200-volt high tension, 2,300 or 575-volt low tension, single-phase transformers, referred to in the last Report, have been delivered by the Canadian General Electric Company, and were installed and connected for 13,200-volts on the high tension. All the 26,400-volt switching equipment and connecting material have been shipped for changing from 13,200-volts on the high tension to 26,400 volts, and the Commission expects to commence installation of same within the next few weeks. The three 150-kv-a., 13,200-volt, single-phase Canadian Crocker-Wheeler Company's transformers were shipped to Baden Distributing Station.

Stamford Township

The system purchased by the township from the Ontario Distributing Company has been operated by the Commission for the township. The necessary engineering assistance was given in remodelling and extending the system, and it is expected that the township will take over the operation of the system early in 1918.

Stratford

The new sub-station which is to be as complete and modern as is possible is nearly completed, and the large transformers were used in a temporary position in order to take care of the increased load during the year. A number of new power customers were connected and considerable revision has been made in the distribution system. Users of direct current were notified that this class of power would not be given after September 1, 1917, and new 25-cycle motors have been purchased to take the place of the direct current equipment.

Municipal Station

Contract for construction of a building to cover requirements of the Stratford Utilities Commission was awarded, on their instructions, to Mr. Robert Marson, of Stratford, on the basis of drawings and specifications which were sent to the Local Commission in October 1916.

The contract included supply and erection of structural steel which was furnished by the Stratford Bridge Works. The building was constructed adjoining the

original sub-station, and is 54 feet 6 inches long by 30 feet wide by 42 feet 9 inches high from basement floor to top of parapet wall. Masonry, construction of walls and floors, etc., is in accordance with Hydro-Electric Power Commission's general specifications. The building contains two storeys and a basement over entire area.

Construction of building was started in December 1916, and work has been completed.

On June 1, 1916, the contract was placed with the Canadian General Electric Company for three 750-kv-a., 26,400 or 13,200-volts star high tension, 4,000-volts star or 2,300 or 575-volts delta low tension, 25-cycle, oil-insulated, water-cooled, 3-phase transformers. One transformer was placed in service in a temporary building beside the old station on November 16th. The second and third transformers were shipped on February 2d, and one was placed in service, both being in the temporary building. On February 22d the contract was placed with the Canadian General Electric Company, on behalf of Stratford Utilities Commission, for the necessary switching equipment and for a 100-kv-a. potential regulator, all as referred to in the last Report. The high tension switching equipment has been received and installation of same has been commenced by the Commission. The 2,300-volt switching equipment will be shipped during November, and it is expected that this station will be ready for service early in 1918.

Strathroy

During the year the Utilities Commission placed an order for an electrically-driven fire pump, so that with the gasoline engine unit for fighting fire this municipality should be in good condition in that respect.

A large number of consumers have been added, and the local distribution system is in excellent condition and is steadily improving. The auditor's report shows a good surplus for the year.

St. Jacobs

During the year the Police Village of St. Jacob's was connected to the Niagara System. Power is being supplied to the flour mill in addition to the lighting load.

Distributing Station

The construction of a standard pole type distributing station was authorized in February to supply power to St. Jacob's. The equipment consists of a Hydro-Electric Power Commission air-break switch, Delta-Star fuses and choke-coils, one 75-kv-a., 3-phase, 25-cycle, 26,400/13,200/4,000/2,300/575-volt, Maloney transformer and one 575-volt feeder protected with fuses. The metering equipment consists of a Canadian General Electric graphic watt-meter and instrument transformers housed in a corrugated metal meter-house. The installation work was done by the Commission and the station was placed in service on August 28th.

St. Marys

The local system suffered considerably from the loss, by fire, of one of the largest power customers during the year. This was offset somewhat by new customers and the operating report is very favorable. A small electrically-driven domestic pump and a gasoline-driven fire pump have been ordered for the water-works station.

Distributing Station

The installation work for the second bank of transformers, referred to in last year's Report, is almost completed, but owing to the transformers having been badly damaged by the Railway Company while being shipped from Stratford to St. Mary's, new tanks must be obtained before they can be put in service.

St. Thomas

The financial report for the St. Thomas Hydro-Electric System for the year shows the usual good results. At the present the city has approximately 3,070 customers made up of 2,488 domestic lighting, 470 commercial lighting customers, and 112 power consumers, taking a demand for October of 2,037.5 h.p.

In order to improve the lighting service the local management requested data on an automatic voltage-regulator, which was prepared by the Commission, and it is expected that the city will order this equipment at an early date.

Street Lighting

A plan was prepared for the local commission to take out of service the twenty Magnetite arc lamps, which are still in use. It is the intention to add forty-four gas-filled, incandescent lamps to the present system, and an additional constant-current transformer of 30-k.w. capacity, to provide for present and future extensions.

Underground distribution feeders out of the new municipal sub-station were supplied and installed by the Commission in the conduit system constructed as previously reported.

Municipal Station

The building which was referred to in the last annual Report was completed on November 23, 1916.

The installation of the electrical equipment by the Commission was completed sufficiently to place the station in service in April with one 13,200-volt incoming feeder connected. The second 13,200-volt feeder was connected on May 5th, and the installation completed on May 19th. The entire installation and change of equipment from the old station to the new station was made without any serious interruptions to service.

A third 750-kv-a., 13,200/2,300-volt, 3-phase, Canadian General Electric Company transformer was purchased and placed in the station in August to be used as a spare unit.

At the request of the local commission, drawings were prepared in February to cover the design of an exterior entrance to the basement of the new building to admit their motor truck. The work on this entrance was arranged for by the local commission.

Tavistock

This municipality signed a contract for only 50 h.p. and it is gratifying to see, after approximately one year's operation, the load increased to 229 h.p.

Engineering assistance was rendered to the Tavistock Milling Company on the purchase of its motors and a panel for switching and metering equipment. The extensions to the local distribution system were made on advice from the Commission.

Waterworks

As in the case of Palmerston the preliminary work done in connection with pumping in this town is referred to in the 1916 report. Since then the equipment described, consisting of a 4 by 4 inch, 60 Imperial g.p.m. Luitwieler pump, driven by a 3 h.p. electric motor, and automatically operated, has been erected. The unit has been in operation since installation.

Distributing Station

This station was placed in service at 13,200-volts temporarily on October 26, 1916, as described in the last Report, but the permanent installation was not completed until November 21st. The three 75-kv-a., 26,400 or 13,200-volt high tension, 2,300 or 575-volt low tension, 25-cycle, oil-insulated, self-cooled, single-phase, Canadian Crocker-Wheeler Company transformers, were shipped from St. Catharines on March 22d, and was placed in this station about April 1st. These three 75-kv-a. transformers were placed in service on August 4th, connected for 13,200 volts on the high tension and 575 volts on the low tension, at which voltages this station is now operating. The three 25-kv-a. Moloney transformers used temporarily in this station were released and returned to stock.

Tillsonburg

Contracts were obtained for the local system amounting to 370 additional h.p. from the Canadian Cereal Company. Engineering assistance was given the municipality regarding extensions to the local system to care for this additional load as well as other matter pertaining to the operation of the local plant.

The auditor's report for the year shows a substantial surplus.

Toronto Township

The Interurban Electric Company's system having been absorbed by the Commission, it was found necessary to provide for the continuance of a supply of electrical energy to former customers of that company in the Hamlet of Erindale. An investigation was made of the situation by the Commission and plans made for serving this district by an extension to the Toronto Township system. The Erindale lines were rebuilt and new lines constructed so as to make these a portion of the township system. Plans and estimates have also been made providing for various other extensions, a portion of which have already been built.

Vaughan Township

Various petitions were received from residents of the township and the Hamlet of Maple. Acting on these petitions the Commission investigated the situation and found that sufficient business could be secured to warrant the building of a distribution system. Plans were consequently prepared and instructoins issued covering such a system. Power is to be supplied from the Woodbridge transformer station.

Wallaceburg

During the year arrangements were made to increase the sub-station capacity in Wallaceburg, to take care of additional customers including the Chatham, Wallaceburg and Lake Erie Railway Company, and an additional load at the Dominion Glass Company's plant.

Distributing Station

Owing to the increasing load at this station, it was decided to increase the transformer capacity of this station by installing a second bank of three 150-kv-a.. 26,400/2,300-volt, single-phase transformers.

As there was not sufficient room in the present station for the additional equipment, it was decided to purchase from the local commission the section bank of transformers in this room, strengthening the floor, and making other necessary changes in the building.

Plans are being prepared showing the changes required in the electrical layout, and in the building, and quotations were requested on the additional electrical equipment. Three 150-kv-a., 26,400/2,300-volt, single-phase transformers ordered previously for stock from Packard Electric Company were transferred to this work and will shortly be ready for shipment.

The present 26,400-volt oil switch will control both transformer banks, but each bank will be connected through a set of disconnecting switches. On the low tension side, each transformer bank will have its own oil switch connecting it to the 4,000-volt bus, the secondaries of the current transformers on these lines being connected in parallel to the recording wattmeter to reach the total load. Provision is also being made for the installation of an additional 450-kv-a., 4,000-volt feeder equipment for the municipality.

Waterloo

The operating report is satisfactory and shows a very staple condition of the local system. An extension to serve a number of farmers was built north of the city. New electrically-driven pumps have been installed in the waterworks, and water is being supplied to the City of Kitchener.

Watford

The old plant was purchased by the municipality and a distribution system was installed under supervision of the Commission. The station equipment consists of one 50-kv-a. 26,400/4,000 outdoor transformers in the standard pole type station. Power was turned on August 11, 1917. The number of lighting consumers was increased 50 per cent. and two power consumers are also being supplied.

Distributing Station

The construction of a standard pole-type distributing station was authorized in November to supply power to Watford. The equipment consists of a Hydro-Electric Power Commission air-brake switch, Delta-Star fuses, choke coils and arrester, one 50-kv-a., 3-phase, 26,400/13,200/4,000/2,300/575-volt, 25-cycle Moloney Electric Company transformer, and one 4,000-volt feeder protected with expulsion fuses. The metering equipment consists of a Canadian General Electric graphic recording wattmeter with suitable instrument transformers housed in a corrugated metal meter house.

All construction work was done by the Commission and the station was placed in service August 11, 1917.

Welland

Engineering assistance was supplied to Welland in connection with the construction of a new sub-station. The station will be supplied with power at 46,400-volt power.

Distributing Station

At the request of the Welland Hydro-Electric Power Commission, drawings and specifications were prepared covering a new sub-station building, and at a meeting of the Welland Commission on January 16, 1917, the contract was awarded to Mr. J. C. Diffin, of Welland. This building will accommodate four 1,500-kv-a., 3-phase transformers, together with their switching equipment, and for two incoming and two outgoing 45,700-volt, 3-phase lines, and the switching equipment for five 2,300-volt lighting feeders and eight 2,300-volt power feeders. The building is now practically completed. It is 55 by 35 feet by 36 feet high, inside dimensions, with a 10-foot basement under the whole building. The building is constructed of pressed brick with reinforced concrete floors. The roof is supported by steel beams and columns, and with a concrete foundation.

Drawing and specifications were made up and tenders obtained on switching equipment to control one incoming and one outgoing 45,700-volt line, two 1,500-kv-a., 45,700-volt, high tension star, 2,300-volt low tension delta, 3-phase oil-insulated water-cooled transformers, three 2,300-volt lighting feeders, one 100-kv-a., a potential regulator, four 2,300-volt power feeders, and one bank of station service transformers with 110/220-volt station service feeders. The contract for this switching equipment, including the installation of it, was awarded to the Canadian Westinghouse Company on May 17, 1917.

Tenders on two 1,500-kv-a., 45,700-volt star or 26,400-volts high tension, 4,000-volt star or 2,300 or 575-volt delta low tension, 25-cycle, oil-insulated, water-cooled, 3-phase transformers, were obtained and reported on, and the order was placed with the Canadian Crocker-Wheeler Company by the Welland Hydro-Electric Power Commission. On September 16th one of these transformers was put into service temporarily with the necessary switching equipment, of which the 45,700-volt choke-coils and disconnecting switches were borrowed from spare equipment at Niagara Station. Arrangements are such that the load on this station is metered on the 45,700-volt incoming line. The permanent switching equipment will be shipped in December and January next.

Wellesley

An additional power load of 37½ h.p. was obtained during the year, bringing the total load taken by the village over 100 h.p. The operation has been very satisfactory.

West Lorne

Distributing Station

The type "E-2" station referred to in last Report was completed, and, with the exception of Rodney feeder panel, was placed in service on December 22, 1916. The Rodney feeder was placed in service with temporary connections on January 15th, and the permanent work on same was completed and the new panel put into service on February 2, 1917. The installation of recording meters on the feeder panels was completed on February 22d. All installation work was done by the Canadian Westinghouse Company.

Weston

Municipal Station

The installation of the transformer equipment in the Canada Cycle and Motor Works at Weston, which was mentioned in the last Report, was completed and put in service on January 1st by the Commission.

In addition to this work, the Commission received a request from the Corporation to obtain larger transformers for the municipal station to replace the original 50-kv-a. transformers. It was arranged to transfer three 100-kv-a. Canadian Westinghouse Company 26,400/13,200/2,300/575-volt, 25-cycle, single-phase transformers from Niagara Falls Transformer Station, which had been used there for a short time to supply power to the City of Niagara Falls.

Windsor

A number of additions were made to the ornamental street lighting system during the year, and the Water Commission is now considering the installation of electrical-operated pumps at the municipal pumping plant.

Woodbridge

Distributing Station (Vaughan Township Feeder)

Plans are being prepared for a 4,000-volt feeder to supply power to Vaughan Township. The feeder will be tapped off the present Woodbridge feeder through expulsion fuses and metered by a type "R.O." Westinghouse demand meter. The equipment will be installed by the Commission.

Zurich

Engineering advice was given this municipality regarding the operation of a local Hydro-Electric System. The town has contracted for 50 h.p. to be delivered at a cost of $69.34 per h.p. per annum.

The Commission looked after the layout of a distribution system to best meet the local requirements, and supervised the installation of this. A foreman and linemen were procured for the municipality and all labor was paid locally.

The Commission also obtained for the town a contract with the local flour and chopping company for 50 h.p.

Advice has been given from time to time in connection with the operation since power was turned on which was in August 1917.

SEVERN SYSTEM

GENERAL

The year closing October 31, 1917, has proved to be most successful in every respect as far as the Severn System is concerned since plant was taken over by the Commission.

The demands for power in the various municipalities necessitated purchase of a large block of power from the Eugenia System which was supplied over the tie-line between the Eugenia development of the Collingwood sub-station. The transmission line from Port McNicoll to Penetang was double-circuited and the size of the conductor increased from Midland sub-station to Penetang, from No. 2 B. & S. aluminum to No. 2 B. & S. copper. Plans were prepared covering an extension to the generating station at the Big Chute which included the installation of an additional 2,000-k.w. generator. Investigations were also made covering the construction of an additional transmission line from the Big Chute Plant to Waubaushene and also the construction of an inter-switching station at the latter point. Plans were prepared covering the installation of additional switching equipment at all of the large sub-stations connected to the system, in order to provide for taking care of additional loads.

POWER CONSTRUCTION

Big Chute Generating Station

In view of the rapid increase in the power demands of the Severn System, it became necessary, early in 1917, to proceed with the extension of the Big Chute Generating Station; this plant is located on the Severn River, about four miles below the station of Severn Falls on the Canadian Pacific Railway. The present installation consists of three hydro-electric units, each of about 1,100 brake h.p.

To secure the necessary additional capacity, a new penstock and a fourth turbine were required, together with two new valves, head gates and the necessary power house sub-structure and superstructure.

In May 1917, contracts were let for these. The Dominion Bridge Company, of Montreal, secured the contract for the steel penstock which is 9 feet in diameter, and about 170 feet long. The installation is to be completed in December 1917. The Wellman-Seaver-Morgan Company's tender for a double-runner spiral case turbine, of 2,300 brake h.p., under a 56-foot head, running at 300 r.p.m., was accepted. Deliveries to be in February 1918. The contract for two 66-inch diameter gate-valves, together with two head-gate mechanisms, was awarded to the Boving Hydraulic and Engineering Company, of Lindsay. Considerable trouble was experienced in securing the necessary sand and gravel on account of the location of the plant, and the poor transportation facilities. Satisfactory progress, however, has been made, the power house sub-structure being completed and ready for the assembly of the penstock and turbine, while some of the concrete has been poured in the superstructure. The valves on the cross-over between No. 1 and No. 2 penstocks have been set and the penstock material is all on the ground.

The contract for the necessary excavation and concrete work was placed in September with Messrs. Wells & Gray, of Toronto. This extension will be approximately 38 by 69 by 30 feet high over the generator room and 40 feet high over the transformer and high tension rooms. The building will be reinforced concrete, and is expected that it will be completed early in 1918.

Tenders were obtained on the 1,600-kv-a., 300 r.p.m., 2,200-volt, 3-phase, 60-cycle, waterwheel type generator, and in June the contract was awarded to the Canadian General Electric Company.

When making the extension to the station, it was decided to remodel the high tension switching room by installing duplicate 22,000-volt busses, making all 22,000-volt oil switches electrically operated. It was also decided to install equipment for one new 22,000-volt outgoing line and to remodel the 22,000-volt arresters, and to provide space for equipment for two future lines, one to Orillia and one to Waubaushene.

The present switchboard will be rearranged in order to provide space for the panels to control the new and future 22,000-volt lines. New 2,200-volt electrically-operated oil switches will be installed for the low tension sides of the transformers, and the present transformer switches will be used for the new generator and for the station service transformers.

Tenders have been obtained on the new switching equipment required and the order for same will be placed during the next month. The new unit should be in operation in the early part of 1918.

MUNICIPAL WORK

General

Enabling by-laws were submitted to and approved by the electorates of the following municipalities for the purpose of authorizing the execution of new agreements with the Commission covering the delivery of power:—

Penetang, Coldwater, Midland, Elmvale, Barrie, Stayner, Creemore, Collingwood.

These new contracts permit the municipalities to participate in the joint ownership of the Big Chute development, purchased by the Commission after the completion of the original contracts, and also to share in any other development and works required from time to time in the future, as may be needed to supply increased demands for power. Estimates of power costs and rates under the new agreements were prepared by the Commission and submitted.

Assistance was also given by the Commission to each municipality in placing the question before the electors and at public meetings. New agreements were prepared and duly executed by the officials of the municipalities and the Commission.

An investigation of rates was made by the Commission for all municipalities in the Severn System, covering both power supplied by the Commission to the municipalities and also power supplied by the municipalities to their respective customers.

Reductions were duly authorized by the Commission in the following municipalities: Collingwood, Barrie, Stayner, Midland, Penetang, Victoria Harbour, Port McNicoll and Waubaushene.

Estimates covering the cost of power were prepared and submitted, valuations of existing plants were made, the cost of distribution systems determined and assistance was given by the Commission in laying this information before the ratepayers, prior to voting on money and enabling by-laws. This was done in the following municipalities: Alliston, Beeton, Tottenham, Bradford, Cookstown, and Thornton.

Enabling and money by-laws were submitted and carried in all of these places, and agreements were completed with the Commission for the delivery of power. Assistance of a similar nature was also given to the Police Village of Hillsdale and Floss Township (for the Hamlet of Phelpston), but the submission of by-laws was deferred in these places until a later date.

Engineering advice and assistance was given to the following municipalities in the nature of soliciting power loads and new customers, also in various matters pertaining to the operation and management of their systems, and periodical trips were made by engineers of the department to each town and village for the purpose mentioned:—

Penetang, Midland, Victoria Harbor, Port McNicoll, Waubaushene, Coldwater, Elmvale, Barrie, Stayner, Creemore, Collingwood.

Estimates and reports were prepared and submitted covering rates and cost of service to the following townships or portions of same:—

Innisfail, Essa, Tecumseh, West Gwillembury, Tossorontio.

Alliston

Waterworks

Towards the end of the summer a request was received from the town asking that an engineer be sent to look into the question of the provision of electric pumps.

As a result, it is intended to install:

(1) A.6-in.3 stage, 550 Imp. g.p.m., centrifugal fire pump, capable of working against a head of 130 lbs. per sq. in., direct-connected to a 75 h.p., 3-phase, 60-cycle, 550-volt, 1,200 r.p.m. induction motor.

(2) A.3-in.-2 stage, 150 Imp. g.p.m., centrifugal domestic pump, capable of working against a head of 65 lbs. per sq. in. pressure, and also capable of delivering 250 Imp. g.p.m. against 50 lbs. per sq. in. pressure, direct-connected to a 15 h.p., 3-phase, 60-cycle, 550-volt, 1,700 r.p.m. induction motor with automatic control.

Early in January next a by-law relating to the foregoing is to be voted on by the people.

Distributing Station

A standard type "H" station was authorized for Alliston, and the building contract was awarded to Wells & Gray, Toronto, who completed the building in October.

The station will be fed by one 22,000-volt line through air-break switches and will be equipped with Delta-Star outdoor arresters. The station equipment will consist of three 40-kv-a., 22,000/2,200-volt, single-phase, 60-cycle, Canadian Westinghouse Company transformers, with one 4,000-volt, 250-kv-a., outgoing feeder.

The Canadian Westinghouse Company were awarded the contract to supply and install the switching equipment in this station except the low tension arresters and the switchboard meters. Weston indicating meters were purchased from A. H. Winter Joyner, Limited, and the recording wattmeter was purchased from the Niagara Electric Improvement Corporation. Garton-Daniels low tension arresters are being supplied by the Commission. Two of the transformers will be transferred from Hanover, where they were formerly in service, and a third transformer will be purchased to complete the bank. The installation will be completed early next year.

Street Lighting

There will be installed in the Alliston Distributing Station for the Municipality one 16-kv-a., 4-ampere, 60-cycle, Canadian General Electric Company constant current transformer to supply street lighting. This transformer was purchased from the Municipality of Orangeville, and installation will be done by the Commission.

Camp Borden

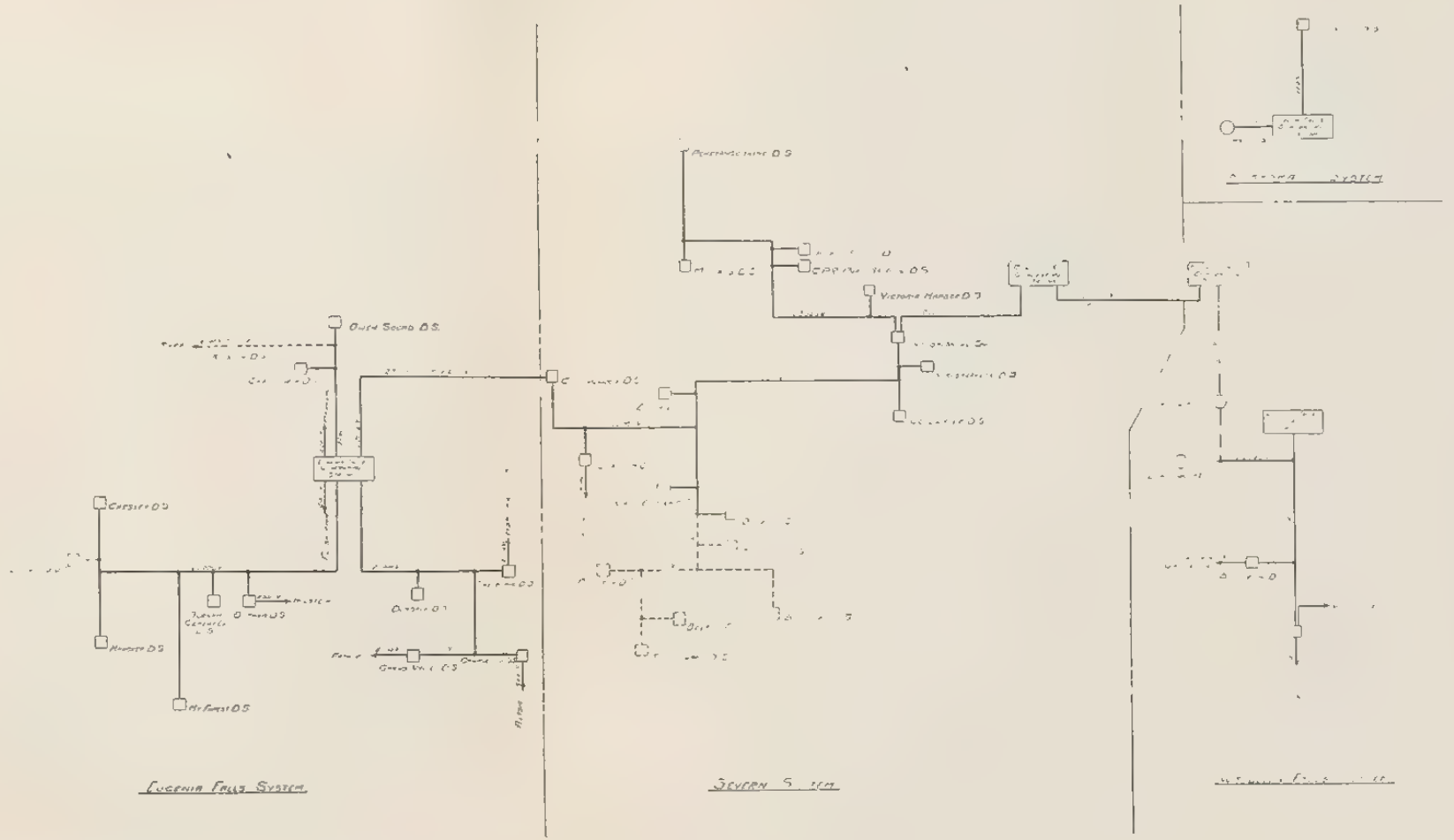
Municipal Station

The purchase and installation of an additional 4,000-volt feeder panel and connecting material for the Camp Borden municipal station was authorized by the Department of Militia and Defence in March 1917, to supply the Aviation Camp.

A rush order was placed with the Canadian Westinghouse Company on March 12, 1917, and the panel was shipped on May 2d and immediately installed by the Commission, and connections were made. The wattmeters of the "R.O." type, were not shipped with the panel and a temporary Esterline wattmeter was installed by the Commission. The "R.O." meters, when received, were promptly installed and all details of the work were completed on July 27th.

Cables were supplied and installed by the Commission in an underground conduit system constructed for the use of the Aviation Department at Camp Borden.

Special street lighting equipment was designed and installed by the Commission for the illumination of the roadways at this camp during the year.



HYDRO-ELECTRIC POWER COMMISSION
OF ONTARIO
DIAGRAM OF EUGENIA FALLS, SEVERN, WASDELL'S FALLS, AND MUSKOKA SYSTEMS, 60 CYCLES.

Approved ... Chief Engineer
Oct 23 1917

KEY

C-165

Collingwood

During the year an extension was made to the distribution system for the purpose of supplying power to a large steel plant and electric smelter. All of the construction work and engineering was performed by the Commission.

The increase in power supplied in this municipality also necessitated the installation of special and additional apparatus in the sub-station for supplying a portion of the load from the Eugenia System, which ties into the Severn System at the Collingwood station.

The total increase in power supplied to consumers in Collingwood during the year 1917 exceeded by 1,000 h.p. the previous year's demand.

Distributing Station

Plans were prepared for the construction of a 24 by 27 by 25 ft. high extension on the end of the present building to accommodate a 22,000-volt tie-line to the Eugenia System, and to provide for a second bank of transformers in future. The extension, which was built on contract by Mr. H. G. Wynes, of Collingwood, was made similar to the present building except that it was four feet higher, to obtain more head-room for the electrical apparatus.

The arrangement of the electrical equipment was changed to have two 22,000-volt lines from the Severn System and one from the Eugenia System enter the station and to connect to a double bus through oil switches and selector disconnecting switches, each line having its own lightning arrester. Potential transformers were also placed on each line, and a synchroscope provided so that lines could be synchronized. The present transformer bank was also provided with an oil switch and selective disconnecting switches, and space was left for a similar arrangement for a future transformer bank.

A contract for the necessary electrical equipment was let to the Canadian General Electric Company, but the graphic wattmeters were obtained from the Canadian Westinghouse Company, and the Weston indicating meters from A. H. Winter Joyner.

Two additional 2,300-volt feeder panels and equipment were ordered, one to supply the William Kennedy Company, Limited, and one to supply the Collingwood waterworks. These are being installed for the municipality in the Collingwood distributing station by the Commission.

To improve the power factor of this station, the Collingwood Water and Light Commission purchased from the Kingston Civic Utilities a 312-kv-a. Westinghouse synchronous generator, to be used as a synchronous condenser, with the switchboard panel to control it. The Collingwood Commission also purchased from the Power Plant Equipment Company, of Toronto, for use with this machine, a 15-k.w. Holtzer-Cabot, 110-volt exciter, direct connected to a 20 h.p. Westinghouse induction motor. This motor is belted to the 312-kv-a. generator, and is used to bring the generator up to synchronous speed. The generator then is used as a synchronous motor, driving the exciter. This set was first placed in service on October 31, 1917.

All the installation work is being done by the Commission and it is almost completed.

Midland

Due to increased demands for power by new and existing customers, a complete rearrangement was made in the distribution system power feeders in the municipality. All engineering and construction work in connection with these changes and extensions was performed by the Commission.

Old Distributing Station

Owing to the steadily increasing load on this station, it was found necessary to increase the transformer capacity, and three 300-kv-a. 22,000/2,300-volt, single-phase, 60-cycle, Moloney transformers were purchased and installed in March, replacing three, 150-kv-a., 22,000/2,300-volt, single-phase Moloney transformers, which were then transferred to Orangeville distributing station.

New Distributing Station

It was later decided to construct an entirely new sub-station building in a more suitable location close to the waterworks station and arrangements were made to that end with the Midland Water and Light Commission. At the local Commission's request plans and specifications were prepared for a new sub-station of a modified standard, "G.L." type. Specifications call for a brick building 34 by 26 by 17 feet, 10 inches high. These plans were transmitted to the Midland Commission which had the building erected and completed in June.

The new station is fed by two 22,000-volt incoming lines through oil switches to the high tension busses which feed the three 300-kv-a., 22,000/2,300-volt, single-phase power transformers. Both lines are protected by electrolytic lightning arresters, and the oil switches have reverse power and definite time overload relays for automatic tripping. The transformer low tension delta bus is connected through an oil switch to the 2,300-volt bus at the switchboard, and from this bus four feeders are taken out of the station through automatic oil switches, one of these being taken through a conduit underground to operate the waterworks pumps in the pumping station near by. Another feeder is taken off the busses, through expulsion fuses, and carried across the end wall to a panel controlling a 35-k.w., type "R.N.", Canadian General Electric constant-current transformer, from which a series street lighting feeder is taken out of the building. All the oil switches are hand operated, and are of remote control type, except those on the waterworks and street lighting feeders, which are mounted directly on the panels.

The Canadian General Electric, 35-k.w., constant-current transformer, with its panel, was removed from the pumping station to the new station. The three 300-kv-a., 22,000/2,300-volt, single-phase Moloney power transformers; two 22,000-volt disconnecting switches were obtained from the old Midland distributing station, together with four switchboard panels and their equipment, and busses back of the switchboard and other available apparatus, as much material as possible being used from this old station.

One new 22,000-volt electrolytic arrester was purchased from the Canadian General Electric Company, and the waterworks feeder panels and equipment was purchased from the Canadian Westinghouse Company. Insulators and other apparatus necessary to complete the installation were purchased from various other companies.

The equipment is being installed by the Commission and the transformers were removed to the new station and placed in service on August 27th, but the installation has not been entirely completed due to the non-delivery of some of the apparatus.

Orillia

Due to the heavy demands for power in the municipality, arrangements were completed with the Commission for supplying large blocks of power to various industries engaged in the manufacture of war munitions.

An additional contract was executed between the municipality and the Commission, covering a permanent supply of power from the new Swift Rapids' plant under construction by the town. This contract covered the paralleling of the Swift Rapids' generating station with the generating stations located at the Big Chute, Wasdell's Falls and Eugenia, the joint use of transmission lines and the supplying of emergency power by both parties.

Port McNicoll

Distributing Station

Owing to increase in load on the transformers in this station, authorization to purchase larger transformers was given, and three 500-kv-a. 22,000-volts (primary), 575-volt (secondary), single-phase, 60-cycle, water-cooled transformers, having a 333-kv-a., self-cooled rating, were purchased from the Canadian General Electric Company on February 13th to replace the existing three 250-kv-a., self-cooled transformers. In order to improve the operating conditions at this station for the increased load it was decided to rearrange the switching equipment so that there would be an oil switch and a lightning arrester on each of the two incoming 22,000-volt lines. It was also decided to locate the 500-kv-a. transformers and 22,000-volt oil switches on the main floor instead of in the basement, where the 250-kv-a. transformers are located. In order to accommodate this arrangement the Canadian Pacific Railway Company is preparing to make the necessary changes in the building.

The necessary additional switching equipment for the above has been purchased from the Canadian General Electric Company. It is expected that the 500-kv-a. transformers will be installed in November. Arrangements are being made to install the permanent equipment during January and February, when the load on the elevator is very light. The three 250-kv-a. transformers will be transferred to Durham Cement Company's distributing station.

EUGENIA SYSTEM

GENERAL

The second year of operation of the Eugenia System has been a most successful one. The tie line between the Power House at Eugenia and the Severn System lines at Collingwood constructed during the latter part of 1916 has been in operation throughout the entire year and has enabled the Commission to market all of the surplus power available at the Eugenia development in the municipalities located in the Severn district and has made possible the maintenance of an ideal load factor at the Eugenia Falls generating station.

The loads in the municipalities connected to the System have manifested a steady increase and several new customers have been secured throughout the district. The total increase in the demand for power has been such that it has been found necessary to double the capacity of the plant and install an additional 4,000 h.p. unit. Construction work on this extension is progressing favorably, and it is expected that the new unit will be in operation early in 1918. During the year four additional municipalities were connected to the system and provision made for supplying four others to be added early in 1918.

By-laws were submitted and carried in two municipalities.

At the close of the fiscal year—October 31, 1917—fifteen municipalities were being served by the Eugenia System.

Distribution systems inclusive of street lighting were designed, constructed and completed in the following municipalities during the year, under the supervision of the Commission, and Hydro service was given for the first time to such systems from the Commission's transmission lines:—

Arthur, Tara.

Estimates and reports were prepared and submitted covering rates and cost of Hydro service to the following Townships or portions of same:—

Brant, Bentinck, Derby, Collingwood, East Luther, Amaranth, Caledon, Artemesia.

Engineering assistance and advice were given to the following municipalities in the matter of rate application, soliciting of power loads and new consumers and other matters pertaining to the operation and management of their respective systems:—

Owen Sound, Chatsworth, Markdale, Flesherton, Dundalk, Shelburne, Orangeville, Grand Valley, Arthur, Mount Forest, Holstein, Durham, Chesley.

An investigation was made by the Commission covering the delivery of power to the following municipalities. Estimates were prepared, possible power demands and transmission line routes determined upon and reports submitted covering these conditions:—

Walkerton, Mildmay, Formosa, Clifford, Teeswater, Wingham, Lucknow, Ripley, Gorrie, Fordwich, Wroxeter, Brussels, Blyth, Kincardine, Paisley, Southampton, Port Elgin, Wiarton.

Valuations were made during the year by the Commission of the following privately owned power developments, including transmission lines and distribution systems with the idea of utilizing the same in connection with the Eugenia development for supplying power to the district adjacent to each:—

Hanover Electric Light and Power Company, Hanover.

Sauble Falls Power Company, Wiarton.

Cataract Power Company, Orangeville.

Walkerton Electric Light & Power Company, Walkerton.

Saugeen Electric Light and Power Company, Southampton.

Valuations were made, distribution systems designed and estimates prepared for the following municipalities for the purpose of determining the cost of Hydro service:—

Wiarton, Wingham, Walkerton.

POWER CONSTRUCTION

Eugenia Falls Generating Station

This plant is located on the Beaver River, near the village of Eugenia, and was completed and placed in operation on November 18, 1915.

Early in 1917, the load demand on the system was increased to such an extent that it was decided to increase the initial capacity of the plant, which now consists of two units, each 2,250-brake horse-power, direct-connected to 1,400-kv-a. generators.

On June 7, 1917, a contract for a single runner turbine delivering 4,000 h.p. at 720 r.p.m. under a 550-foot head, was let to the Allis-Chalmers Company, of Milwaukee.

The original designed maximum installed capacity of this plant was fixed at four 2,250 h.p. units, but the plan, as it will be completed, will contain two 2,250 h.p. units and two 4,000 h.p. units.

The Eugenia system now feeds the Severn system during peak-load hours, and will later be tied-in with the projected plant on the Saugeen River near Port Elgin. The high head and large reservoir capacity of the Eugenia Station make it unusually efficient as a peak-load plant. The market conditions at the time of letting the contract practically prohibited the obtaining of a unit of the same capacity as the previous ones installed, while the Allis-Chalmers Company had already developed and had patterns available for the larger unit. These reasons primarily influenced the decision to install the 4,000 h.p. unit, the construction of which is now well advanced in the shops. Delivery of this unit is expected in the early part of 1918.

A contract for the steel distributor and connection to No. 1 penstock was let to the Canadian Des Moines Bridge & Iron Company, of Chatham, for delivery in January 1918.

The new unit will run on water delivered by No. 1 penstock, which now supplies the two original units. Space has been provided in the generating station for the fourth unit. When this is installed, it will be necessary to install the second penstock and surge tank.

It is expected that the new unit will be in operation by April 1918.

Electrical Equipment

Both a high tension and low tension double bus system are to be installed throughout, and also a second bank of power transformers, a Tirrill voltage regulator, a larger storage battery, three additional outgoing 22,000-volt lines and switching, metering and control apparatus for this equipment.

Owing to war conditions it was impossible to obtain from Europe turbines similar to those originally installed to drive 1,410-kv-a. generators, but a turbine of double this capacity could be readily obtained in this country. Therefore, in June a contract was made with the Canadian Westinghouse Company for a horizontal direct-connected water wheel type generator of 2,820-kv-a., maximum rating, at 85 per cent. power factor, three-phase, 60-cycle, 4,000-volt, 720 r.p.m., with a 40 k.w., 125-volt, direct-connected exciter. Delivery is promised by February 1918, and the installation is to be made by the manufacturer.

A contract was placed with the Canadian Westinghouse Company for three 900-kv-a., 22,000/4,000-volt, single-phase, water-cooled transformers, identical with those of the original equipment. Installation to be made by the manufacturer.

A contract was also placed with the Canadian Westinghouse Company for the high tension and low tension switching and double bus equipment, switchboard panels, graphic meters, and a Tirrill voltage regulator. Installation is to be made by the manufacturer. The order for Weston indicating meters for the new switchboard panels was placed with A. H. Winter Joyner, Limited. The old bus system is to be changed over to a double bus system to correspond with the new installation.

Each generator, transformer bank or feeder, is to connect to its respective section of low tension or high tension double bus through its oil switch and a group of selector disconnecting switches.

Feeder oil switches are to be controlled by definite time overload relays and transformer oil switches by a system of differential relays. The generator oil

switches are non-automatic, but plans for a relay scheme to make them automatic are under consideration.

A control room is to be provided in the extension of the building and the existing switchboard panels are to be removed from their present location, and together with the new panels, installed in this control room.

An order has been placed for a 100-ampere-hour type "G-4" 100-cell Edison storage battery to replace the present 80-ampere-hour, 60-cell lead-battery for control operations.

Provision is being made for the future installation of a fourth generator, a third bank of transformers, two 22,000-volt lines, one 4,000-volt feeder, and a motor-driven exciter.

A total of eight 22,000-volt lines is, therefore, possible from this station.

Building Extension

To provide space for this new equipment and the changes contemplated, it was found necessary to extend the present building from approximately 39 ft. to 112 ft. in length and from 60 ft. to 69 ft. in width. The building will have concrete foundations, brick walls, and reinforced concrete floors and roof supported on steel work.

The change in width was necessary to accommodate the high tension double bus structure.

The contract for the steel was placed with the McGregor-McIntyre Company and for the pressed brick with the Inter-Provincial Brick Company.

The erection of the building is being carried out by the Commission.

The work is being pushed rapidly forward, and it is expected that the new equipment will be completely installed and ready for service early in the coming spring.

MUNICIPAL WORK

Chesley

Waterworks

About September 1916, the matter of pumping was first taken up here, and on October 3, 1916, instructions were received from the Town Council to investigate it. A report was made in November 1916, and on February 12th of this year two propositions were laid before the authorities, one embracing an estimate for a deep-well pump, capable of delivering 106 Imperial g.p.m. against a total head of 230 feet inclusive of 60 feet lift, driven by a 10 h.p., 3-phase, 220-volt, 60-cycle, slip ring motor with both hand and automatic starting equipment. The other being an estimate for a 150 Imperial g.p.m. rotary pump with a 20 h.p. motor, together with an air compressor driven by an electric motor.

On March 1st of this year instructions to order a pump in accordance with the first estimate were received and the order was placed the same day. The equipment was shipped at the end of April and was put into operation shortly after. The estimated saving, based on three months' operation, is $430 per annum, after allowing $251 annually to cover the increased capital charges.

Derby Township

Rural Power

A petition was received and estimates prepared and submitted in connection with a proposed extension from the Tara Station to serve thirteen farms in this district.

Kilsyth Distributing Station

In the last Report it was mentioned that the construction of a pole type distributing station was authorized at Kilsyth, and that a suitable design which could be standardized was being developed. This design has been completed during the past year, and a station constructed from this design. The equipment consists of a Hydro-Electric Power Commission air-brake switch to connect the station to 22,000-vole line, a 75-kv-a., 22,000/4,000/2,300/575-volt, 3-phase, 60-cycle, Moloney Electric transformer protected by Delta-Star 22,000-volt combined fuse and choke coil mounting and a delta-star arrester. The low tension equipment consists of two 4,000-volt feeders to Kilsyth and Tara, protected by 4,000-volt fuses and Garton-Daniel arresters. The metering equipment consists of Canadian Westinghouse Company "R.O." maximum demand meters with suitable instrument transformers housed in a corrugated metal building. It is expected that this station will be placed in service in December.

The construction of this station was done by the Commission. The switching equipment was ready for service the end of September, but owing to the transformer having been damaged during railway transportation, it had to be returned to the factory for repairs, which are not yet completed.

Durham

Cement Company's Distributing Station

During the year a contract was completed with the National Portland Cement Company for supplying 1,000 h.p. per annum to the company's plant at Durham.

Work instructions were received in September for the installation of a 1,000-kv-a. frequency changer set to change the frequency from 60-cycles to 25-cycles for supply of power to the National Portland Cement Company at Durham, Ontario. The equipment will consist of two Canadian Westinghouse Company "GA-3" 26,400-volt oil switches and two Canadian General Electric Company electrolytic lighting arresters, instrument transformers with overload and reverse power relays to protect two incoming 22,000-volt lines. Three Canadian General Electric 250-kv-a., 22,000/2,300/575-volt, 60-cycle, self-cooled transformers to be transferred from Port McNicoll (C.P.R.) Distributing Station will be used to step the voltage down to 2,300-volts to supply the 60-cycle motor on the frequency changer set. This frequency changer set will deliver power at approximately 600-volts, 25-cycles to the Cement Company's bus bars. This equipment will be installed in the space in the boiler room of the Cement Company's plant made vacant by the boilers being removed.

The frequency changer set was manufactured by the Electric Machinery Company of Minneapolis and was purchased by the Commission. Work is being started on the installation of this equipment by the Commission, which will install the entire equipment. It is expected that this station will be in operation the early part of 1918.

Elmwood

Distributing Station

The construction of a standard pole type distributing station at Elmwood was authorized in November and all equipment was ordered. The station will consist of Hydro-Electric Power Commission air-brake switch, 50-kv-a., 3-phase, 22,000/4,000/2,300/575-volt, 60-cycle, Moloney Electric Company transformer, delta-star fuses and choke coils. The metering equipment will consist of a Canadian West-

inghouse Company "R.O." maximum demand meter with suitable instrument transformers housed in a metal meter house to measure the power supplied to the Municipality over a 4,000-volt feeder.

The construction work will be done by the Commission.

Grand Valley

Distributing Station

The construction of a standard type "H" Distributing Station at Grand Valley with all equipment, as given in the last Report, was completed and put into service in August 1917.

The Municipalities of Grand Valley and Arthur were provided with temporary single-phase service from November 1916, until the new station was put in service.

Hanover

Enabling and money by-laws were submitted to and carried by the ratepayers of the town, authorizing the execution of an agreement with the Commission for a supply of power and providing for sale of debentures covering the cost of purchasing and reconstructing the distribution system. Agreements were also completed with the Hanover Electric Light Company covering the purchase of the company's properties inside the limits of the municipality and with the Commission covering the supply of power.

Assistance was given by the Commission's engineers in addressing public meetings and giving general information in connection with the by-laws, also in carrying on purchase negotiations with the Hanover Electric Light and Power Company. A distribution system was designed and the construction of same authorized.

An agreement was also executed between the Commission and the Hanover Electric Light Company covering the purchase of all properties belonging to the latter, located outside of the municipality, with the exception of Maple Hill development.

The load in this municipality has every prospect of being one of the largest in the district.

Street Lighting

To supply the street lighting circuit the purchase of a 12-kv-a., 2,200-volt, 6.6-amp., constant-current transformer and panel for same was authorized by the municipality and orders were placed with A. H. Winter Joyner, Limited, for an Adams-Bagnall transformer. The Canadian General Electric Company will supply the switchboard panel.

Temporary Distributing Station

Owing to the increase in load, the two 40-kv-a., 22,000/2,200-volt, single-phase, Canadian Westinghouse transformers were taken out of service in April and were replaced by two 125-kv-a., 22,000/2,200-volt, single-phase, Canadian Westinghouse transformers which were transferred from Orangeville Distributing Station. The 40-kv-a. units were later transferred to Alliston Distributing Station.

Permanent Distributing Station

In June, a standard type "G" station was authorized to replace the temporary station and the building contract was awarded to Wells & Gray, Toronto. The building was completed in September.

The electrical equipment in the new station will consist of three Canadian Westinghouse 125-kv-a., 22,000/2,200/500-volt, single-phase transformers, with the necessary high tension equipment for one incoming 22,000-volt, three-phase line, and the low tension equipment for two outgoing 4,000-volt, three-phase feeders, one to supply Hanover and the other to supply Neustadt, Carlsruhe and Ayton.

The 22,000-volt oil switch, lighting arrester and current transformers, were purchased from the Canadian General Electric Company, and the choke coils, disconnecting switches and insulators were purchased from the Canadian Westinghouse Company. All this high tension equipment will be installed by the Commission. All the low tension equipment, except the meters and Garton-Daniels lightning arresters, will be supplied by the Canadian General Electric Company, who will also make the complete low tension installation. The station wil be equipped with Weston indicating meters and Niagara Eectric Improvement Corporation watt-meters.

As the permanent installation cannot be completed till the first of the year, arrangements are being made to have the station put in temporary service by the Commission until the permanent low tension equipment is received.

Orangeville

Distributing Station

The new sub-station building referred to in last Report was finished. The new station was placed in service in February with temporary connections owing to failure of the 150-kv-a. Allis-Chalmers Bullock transformer, referred to in previous Report, using three 50-kv-a. transformers purchased from Moloney Electric Company, for the Shelburne Distributing Station, diverted temporarily to Orangeville. The damaged transformer was found to be not worth repairing, and was disposed of as scrap. One 125-kv-a., 22,000/2,200/550-volt, 60-cycle, transformer was ordered from the Canadian Westinghouse Company in January 1917, to complete the bank for this station, but following the failure above referred to, it was decided to duplicate the order, which was done in March.

Owing to release of three 150-kv-a. transformers from Midland Distributing Station, and the necessity for increased transformer capacity at Hanover Distributing Station, it was decided to transfer the three 125-kv-a. Westinghouse transformers from Orangeville Distributing Station to Hanover Distributing Station and to transfer the three 150-kv-a. Moloney transformers from Midland Distributing Station to the Orangeville Distributing Station. These 150-kv-a., 22,000/2,300/575-volt, 60-cycle Moloney Electric Company single-phase transformers were placed in service in Orangeville Distributing Station the end of April and the 50-kv-a. transformers thereby released from temporary service there were shipped to Shelburne Distributing Station at the same time.

The 22,000-volt electrolytic lightning arresters referred to in previous Report were placed in service the end of June. All details of the installation in Orangeville Distributing Station were completed early in September.

Alton Feeder

Work instructions were received for the installation of a 4,000-volt feeder in the Orangeville Distributing Station to supply power to the Village of Alton. This was accomplished by using one of the feeder panels transferred from Midland Distributing Station to Orangeville Distributing Station, as mentioned in last Report, and equipping this panel with a Niagara Electric Improvement Corporation

graphic maximum demand meter to measure the load. This work was completed by the Commission and put in service in March.

Street Lighting

The two 10-kv-a. constant current transformers and panels, referred to in previous Report, were installed in the Orangeville Distributing Station for the municipality by the Commission and were ready for operation the latter part of June.

Shelburne

Distributing Station

As stated in the last Report the original transformers were destroyed by fire while installed in the temporary building, and it became necessary to order new transformers and in the meantime carry the load with two 25-kv-a. Moloney transformers, which were intended for Coldwater Distributing Station. Since the last Report, the new three 50-kv-a., 22,000/2,300/575-volt Moloney transformers, which were temporarily used at Orangeville, were received and installed early in May by the Commission, and all work completed in this station, the high tension arresters being finally completed on September 1st.

Street Lighting

The street lighting equipment mentioned in last Report as being temporarily installed in the Town Hall was transferred to the distributing station and permanently installed.

WASDELL'S SYSTEM

TRANSMISSION LINES

The high tension lines, consisting of 1/0 aluminum were replaced with 5/16-inch, seven-strand steel from the generating station to Beaverton, and with ¼-inch, seven-strand steel from Beaverton to Cannington. A very considerable economy was effected by this change.

MUNICIPAL WORK

Beaverton

The installation of 22,000-volt lightning arresters in Beaverton distributing station was authorized in October 1916. It was decided to transfer the multi-gap Westinghouse arresters from Cannington distributing station. This work was done by the Commission and the arrester was placed in service in Beaverton distributing station in August.

Brock Township

Service extensions have been made, supplying light and power to farms out of Cannington, and on the Cannington-Woodville 4,000-volt line.

Cannington

As a 22,000-volt lightning arrester was required at Beaverton distributing station, it was decided to transfer the multi-gap arrester from this station to Beaverton distributing station, and to purchase an electrolytic type of arrester to replace it. Accordingly an order was placed with Canadian General Electric

Company on November 24, 1916, for an electrolytic arrester with accessories. This was shipped the latter part of June. Upon its arrival at Cannington, the Commission removed the multi-gap arrester from service and installed the electrolytic arrester, the work being completed on July 30th.

Gamebridge

Power was delivered to this hamlet from the 4,000-volt Brechin line in June 1917. One power, four commercial and four domestic services have been installed.

Kirkfield

Valuations were made and estimates completed on the construction of a 22,000-volt line from Gamebridge to the crushing plant at Kirkfield. Actual construction has been postponed until conditions become normal.

Raven Lake Portland Cement Company

A valuation and report was made on the Raven Lake Portland Cement Company's system, with the idea of purchasing it and supplying power to the towns of Kirkfield, Minden and others in the district. An industrial survey was made of the district to determine the probable load. It was found, however, that the loads would be too small to warrant anything being done in this connection.

CENTRAL ONTARIO SYSTEM

GENERAL

Rates

The Commission's standard forms of rates were placed in effect in all the municipalities on this system on January 1, 1917, these rates applying to Power, Commercial Lighting and Domestic Lighting. In almost all cases the new rates to consumers are lower than those in effect before operation by the Commission was begun. Street lighting rates were reduced in several municipalities. All flat rates have been abolished and replaced by standard meter rates. There are still a small number of power contracts in force embodying obsolete rates, but these are being replaced by standard contracts as rapidly as they mature.

General Stores Department

A general storehouse has been established in Belleville, in which is kept a stock of line material, wiring devices, fittings, transformers and motors. Material is requisitioned from this storehouse by the various local offices as required, thus permitting the reduction of local stocks to a minimum, and ensuring the benefits of quantity buying and prompt delivery.

Offices

A number of local offices were found to be quite unsuited for the business of an electric utility, and as leases expired, improved quarters were obtained. In equipping new offices every effort has been made to ensure the comfort and convenience of customers and staff, as well as to make possible the merchandising of appliances with the greatest efficiency. New offices have been so equipped at Port Hope, Cobourg, Brighton, Napanee and Lindsay with very good results.

Campbellford Pulp Mill

The operation of this mill has been continued by the Commission throughout the year. A supply of pulpwood for many years to come has been assured by the purchase of all the timber in the Township of Bruton in the County of Haliburton. In this limit there is a large supply of excellent spruce and balsam pulpwood as well as other timber. A number of camps are now operating in the Township, and it will not be necessary to purchase any further supplies from settlers as has been done in the past.

All the timber cut in Bruton Township will be driven down the York Branch of the Madawaska River and Baptiste Lake to Bancroft, where it will be taken out of the water and shipped *via* Canadian Northern and Grand Trunk Railway to Campbellford *via* Anson Junction.

The 600-ton pulp press has been completely installed, together with an intermediate pressure, triplex power pump, which make a full equipment of four presses and pumping plant, easily capable of producing 30 to 35 tons of air-dry pulp per day.

Estimates have been made on the cost of a two-machine news print mill and on the expansion of the present pulp mill to accommodate this equipment.

An accident occurred from the stripping of a thread in the flange clamping a grinder stone, which caused the shaft to move longitudinally together with the rotating parts of the attached 1,000 h.p. motor. The bearings were forced through the pedestals and caps, which were badly broken, one cap being in 15 pieces.

The pedestals and caps were shipped to Toronto, where they were pieced together, welded by the oxy-acetylene process, refitted to the bearings and returned ready for the motor within the time (about a week) required for the repairs to electrical connections on the motor.

Spare Transformers

One 750-kv-a., 44,000/2,400-volt, 3-phase, 60-cycle, oil-insulated, water-cooled transformer, and two 300-kv-a., 44,000/2,400-volt, 3-phase, 60-cycle, oil-insulated, self-cooled transformers were ordered on December 14, 1916, from the Canadian General Electric Company, to be used as spare units on the Central Ontario System. Tests on these were witnessed at the factory by the Commission's inspector. One of the 300-kv-a. transformers was installed by the Commission at Madoc sub-station and the other at Port Hope sub-station. The 750-kv-a. unit is held at the Canadian General Electric Company's factory for the present.

POWER CONSTRUCTION

Auburn Generating Station

The feeders across the Otonabee River to the lines to Peterboro and the Auburn Woollen Mills Company were rebuilt of heavier material to replace the old river crossing which was getting into a dangerous condition. A feeder panel, metering, equipment, switches, and a lighting arrester were installed to take care of service to the Auburn Woollen Mills Company.

Fenelon Falls Generating Station

Arrangements have been made and a contract proposed under which the Light and Power Commission of Fenelon Falls will sell to the Commission all the

surplus power from the municipality's Generating Station. The old 11,000-volt air-blast transformers in the Commission's Generating System at Fenelon Falls will be discarded and new water-cooled transformers installed to step up the voltage from 600 to 44,000 volts, at which voltage energy will be transmitted to Lindsay.

Oil switches have been installed to replace the old knife switches which were not suitable for operation under present conditions and synchronizing equipment was also installed so that the plant could be synchronized with the rest of the system.

New meter equipments have been supplied, so that complete records of the power generated at this point could be obtained.

In order to permit of a higher voltage transmission to Lindsay, the existing double circuit 11,000-volt line will be converted into a single circuit 44,000-volt line.

Healey Falls Generating Station

The load demands on the Trent River power system made it necessary, in January 1917, to consider extensions to the Healey Falls plant, which is located on the Trent River, about six miles from Campbellford. The Healey Falls Generating Station was originally designed for the installation of four 5,600-brake h.p. turbines, of which two were erected in the completed power house building.

It was decided to install a third penstock, a third unit of the same capacity as the old units (3,750-kv-a., 6,600-volt, 60-cycle, 3-phase, 240 r.p.m., waterwheel type horizontal shaft generator), and to complete the tailrace excavation for the final development.

In May the contract for a steel penstock about 460 feet in length and twelve feet in diameter was let to the Dominion Bridge Co., of Montreal, erection to commence in December 1917. A contract was also let at the same time for a 5,600 h.p. turbine, a double runner, cylindrical casing running at 240 r.p.m., under 72 feet head, to the Wellman-Seaver-Morgan Company, at Cleveland, delivery in February 1918.

Progress on these two contracts has been satisfactory, and it is expected that they will be ready at the required dates of delivery.

Early in June 1917, work was started on the excavation for the penstock line. This was completed in July. Arrangements were made with the Dredging and Dock Company in September for the rental of their dredge, scows and tug for use in removing the excavation for the tailrace and dredging was begun about September 8th.

The amount of material to be moved, most of which is rock, below water level, is about 30,000 cubic yards. This yardage removed to October 31, 1917, is approximately 12,000 cubic yards. It is expected that the balance of this material will be removed before the new unit is ready for operation, and that the new penstock together with the turbine unit will be completed about April 1918.

A contract was awarded March 15, 1917, to the Swedish General Electric Company for one 3,750-kv-a., 6,600-volt, 60-cycle, 3-phase, 240 r.p.m. waterwheel type horizontal shaft generator to be shipped from their factory in Sweden in March 1918, and installed in Healey Falls Generating Station, at the earliest possible date thereafter. The order for the complete switching and metering equipment necessary to place this generator into service was awarded to the Canadian Westinghouse Company, March 17, 1917, for shipment in January 1918. The manufacture of both generator and switching equipment is proceeding and shipping promises will be met.

On account of the expense of getting coal to Healey Falls, it was decided to install electric heaters, which, with the radiation from the machines, will serve to keep the power house at a comfortable temperature.

The switchboard gallery has been enclosed by a metal partition, ordered from the A. B. Ormsby Company on April 21, 1917. The erection of this was completed in October. This will allow the gallery to be heated to a higher temperature than the rest of the power house without the expenditure of too much power.

The generator pits, transformers, pockets and switching galleries have been painted with white enamel, which considerably improves their appearance.

On account of the difficulty of taking care of the operators at this point, it has been necessary to build a new operator's house, which is a duplicate of that constructed at Napanee.

In April a short study was made of applying electrical operation to the 12 by 12 ft. penstock butterfly valves, but the matter was referred to the Hydraulic Department for further information.

On July 28, 1917, orders were placed with the Mechanical Appliance Company and the Canadian Blower and Forge Company for two motors and two fans respectively to assist in the ventilation of the generating station. It is expected that these will be installed early in 1918.

Seymour Generating Station

Old and inadequate switching equipment on lines K. and G. was replaced by C.G.E. Type K 10, 44,000-volt, automatic circuit breakers.

Two generators which were burned out by lightning have been rebuilt complete. One of them is still out of service, but will be ready shortly. No reduction in the output of the system was caused on account of the failure of these machines. A new storehouse has been built to replace the old one, which was inadequate and in a poor state of repair.

Sydney No. 2 Transforming Station and Generating Station

On account of the difficulty of obtaining and keeping help at Trenton, which is caused by the lack of necessary accommodation, it has been found advisable to build an operator's cottage, similar to the one erected at Napanee, and a large house which will be used as a boarding house for our unmarried operators and for the accommodation of maintenance and construction men working at this station.

New equipment has been installed in the transforming station to accommodate the line from Healey Falls, which will be put into service at an early date.

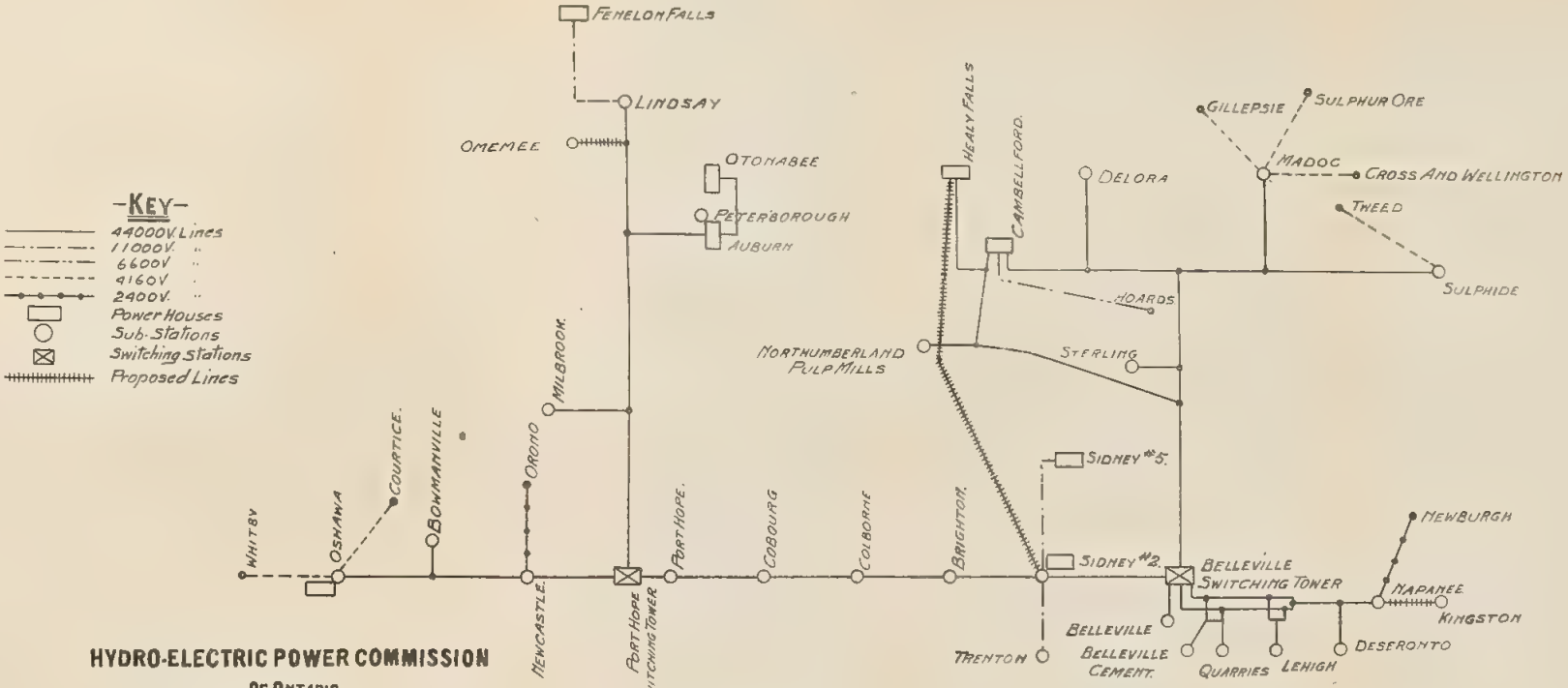
The parapet wall around the roof of the transforming station had to be removed on account of the damage caused by water leaking down through the coping. It was decided on account of other experiences with this type of roof to change the style and to use a flat roof all round.

A new type H.3 automatic, electrically operated, circuit breaker was purchased to take care of the new feeder to Trenton.

Sydney No. 5 Generating Station

The original switches on the switchboard at this place were found to be too small and have been replaced by heavier types of equipment.

Minor changes have also been made in the wiring, and some of the equipment has been rearranged to give increased clearances.



HYDRO-ELECTRIC POWER COMMISSION

OF ONTARIO

Diagram Of Stations
Central Ontario System

Revisions: 25 October, 1916
25 October, 1917.

Approved: [signature]
CHIEF ENGINEER

C-154.
GS

TRANSMISSION LINES

It was thought advisable to commence replacing a number of old insulators with new units, a number of which were erected during the year. All new insulators have been put up on wood pins so as to increase the safety factor of insulation.

The old line, no longer in use, between the Auburn and Otonabee Generating Stations, was dismantled and over 13,000 pounds of copper recovered.

The aluminum conductor on the Millbrook tap was replaced by iron wire, which is ample to handle the load at this station. A reasonable profit on the transaction has been effected. The 44,000-volt tap from the main line to the Deseronto sub-station was moved from its old location in order to provide a clear space for the Aviation Camp established at Deseronto.

A 44,000-volt wood pole transmission line has been constructed from Healey Falls to Trenton *via* Campbellford in order to make available the new 3,750-kv-a. unit at the generating station. This line is connected to the 44,000-volt transmission system at the switching station located at Dam No. 2, Trenton.

MUNICIPAL WORK

Belleville

An electrically-driven pumping plant will shortly be completed for the water supply of the city, replacing two steam units and one electric unit of old design. The building has been enlarged for the reception of the new plant, which will consist of one 780 Imperial gallons per minute, 2-stage, turbine pump with 100 h.p. motor, two 1,250 gallons per minute pumps each with 125 h.p. motor, and one 1,560 gallons per minute pump with 150 h.p. motor, operating against 250 feet total head for domestic service, the same pumps delivering 500, 750 and 1,000 gallons per minute respectively against 325 feet head for fire service.

The pumps are of standard De Laval construction, each unit consisting of two double suction single stage pumps connected in series. Current will be supplied by two sets of transformers mounted on a pole structure outside the pump-house, with the usual switches and other equipment, each set of transformers being served by a separate transmission line.

Bloomfield

Enabling and money by-laws were passed by large majorities on August 31, 1917. A number of petitions have been received from farmers in the surrounding district for a supply of light and power. It is proposed to serve the municipality by a 4,000-volt line from a pole-type sub-station at Wellington.

Bowmanville

The telephone line from Oshawa to Trenton was looped into Bowmanville sub-station so that the line could be sectionalized there in case of trouble.

Brooklin

In connection with the Whitby Township rural extensions out of Oshawa, the village of Brooklin has applied for light and power, and service will be given early in 1918. An efficient system of ornamental series street lighting is being installed under the supervision of the Commission.

Power will be transmitted from Oshawa at 4,000 volts over a single-circuit line of No. 6 copper.

Cobourg

Street Lighting

The Commission has installed a new street lighting system in Cobourg, the work being completed on June 16, 1917. The circuits and poles of the old system were rearranged and put in good order, and the 35 enclosed arc lamps and 75 incandescent lamps of 80 c.p. each, were replaced by gas-filled lamps in modern fixtures. The residential districts are now lighted by 301 units of 100 watts each, and the business district by 17 units of 500 watts each. The arc light regulator was replaced by two constant-current transformers, each of 25-k.w. capacity.

Waterworks

The new waterworks intake and suction well was completed before hard weather set in last winter, and trouble from frazil ice and turbid water previously experienced have completely disappeared.

A new design of automatic coagulant and chlorine feed apparatus has been installed, and is operated by a turbine in the intake. This turbine utilizes the velocity head only, whereby correct distribution of the chemicals at all times is obtained in proportion to the quantity of water flowing to the suction well, which varies from 300 to 1,800 gallons per minute for domestic consumption.

The first unit of a pair of gasoline-driven fire pumps has been connected up to the city mains and is ready for testing. Each unit will deliver from 1,000 to 1,200 gallons per minute, and special precautions have been taken to avoid fire in the station, by placing auxiliary gasoline tanks and gasoline pumps outside the building, with tell-tales and extension pump shafts within the pump house, convenient for operation.

Deloro

The sub-station switchboard wiring has been revised in accordance with modern practice. Old graphic meters have been replaced by new equipment which will allow a more accurate determination of the load.

Edwardsburg Township

Petitions have been received from a number of farmers in this township asking for estimates on the cost of rural power. These estimates have been submitted to the township authorities for consideration.

Hallowell Township

Petitions have been received from several sections of the township for a supply of rural power.

Kingston

In December 1916, a contract for a supply of 1,200 h.p. to be delivered from the Commission's Central Ontario System was ratified by the local commission, and later passed by the council.

Preparations were at once begun on the construction of a 44,000-volt transmission line between Napanee and Kingston. In April 1917, the Commission was authorized to design and supply electrical pumping equipment for the city.

It is expected that the load will be over 1,500 h.p. An annex has been built to the present pumping station intended to conveniently accommodate a motor-

operated plant sufficient for future requirements of the city and one unit of 3,500 imperial gallons per minute.

Distributing Station

Arrangements having been made by the Commission with the Kingston Civic Utilities by which a portion of their steam power plant building, with certain necessary alterations, could be made use of as a distribution station, plans and specifications for the reconstruction work were prepared and contract awarded to Mr. R. N. MacFarlane, contractor, Kingston.

Two 750-kv-a., 44,000/4,160/2,400-volt, three-phase transformers were ordered from the Canadian General Electric Company on December 3, 1916, and a third similar transformer on March 17, 1917.

Existing stock orders were made use of to obtain quick delivery on a Canadian Westinghouse type "GA-3," 44,000-volt oil switch and a Canadian General Electric 44,000-volt electrolytic lightning arrester. The contract for the remainder of the electrical equipment, including low tension switchboard, was awarded the Canadian General Electric Company.

The alterations to the building were commenced on August 13th, and the first transformer will be delivered about December 1st.

Waterworks

An annex has been built to the present pumping station intended to conveniently accommodate a motor-operated plant sufficient for any future requirements of the city, and one unit of 3,500 imperial gallons per minute capacity is nearly ready for installation. This unit will operate against a head of 210 feet, and consists of a 12-inch double suction, single-stage DeLaval turbine pump, connected through a flexible coupling to a C.G.E. synchronous motor of 380-kv-a. at 1,200 revolutions per minute, with the usual exciter and switchboard equipment.

A 24-inch steel suction pipe is connected to the present intake pipe at a point about 150 feet from the pump-house, and is of a temporary nature, consideration having been given to the construction of a suction well in connection with a new intake, low-lift pumping and filtration system.

The discharge from the pump is connected to a new 24-inch main fitted with recording Venturi meter.

Lindsay

Plans and estimates were drawn up for an extension of the White Way on Kent street in this municipality.

Madoc

Totalizing current transformers have been installed so that a record can be kept of the summation of loads supplied from this station. A 300-kv-a. oil-insulated, self-cooled, 3-phase, 60-cycle, 44,000-4,160-volt transformer was installed to provide standby equipment needed on account of the existing apparatus being fully loaded. New metering equipment was installed for various consumers in the district about Madoc.

Napanee

The approval of the Municipal Council was secured for the dismantling of the steam generating plant and the boilers, and most of the machinery has been disposed of by sale.

The connections in Napanee sub-station have been changed over from 2,400 volts to 4,160 volts, enabling power to be fed over the new line to Newburgh and Camden. The feeder panel and metering equipment were installed to accommodate the Newburgh and Camden feeder, and a blank panel was provided to fill the remaining vacant place in the board.

On account of the construction of the line from Napanee to Kingston, it has been necessary to build an operator's house at Napanee sub-station. A five-room house was erected and provided with all modern conveniences, including electric heating. The operator living at this point will attend to the switching on the Kingston line, and the regular patrol of a section of the line, besides taking care of the sub-station.

Omemee

The construction of a pole-type distributing station at Omemee was authorized and three 40-kv-a., 44,000/2,400-volt, 60 cycle, single-phase, outdoor-type transformers were ordered from the Moloney Electric Company on May 4, 1917. Drawings were completed and balance of material required was ordered.

The station will be of the outdoor type with 44,000-volt disconnecting switches, choke coils and fuses, and with the 4,000-volt oil switch and the metering equipment including a General Electric graphic recording wattmeter, placed in a small galvanized iron kiosk.

Owing to commercial conditions the transformers were not shipped as early as promised, but it is expected that this station will be ready for service about January 1, 1918.

A new street lighting system is being installed in Omemee under the supervision of the Commission.

The installation of the necessary transforming equipment, transmission line and distribution system has been practically completed, and power will be turned on from the Central Ontario System early in 1918.

Current will be delivered to the municipality at a pressure of 4,000 volts from the Commission's pole-type sub-station one mile north of the village limits.

Oshawa

A Diesel engine-driven generating unit, formerly used as a reserve source of supply, has been sold, as its capacity was too small to be of material value in case of an interruption to the 44,000-volt supply. It is intended to construct a second 44,000-volt line to Oshawa as soon as normal construction costs again prevail. The 1,200-k.w. generator, formerly in the Otonabee Generating Station, is being installed at Oshawa for power factor correction and voltage control.

Peterborough

Requests have been received from the Peterborough utilities system to prepare plans for a new sub-station. It is intended to proceed with the construction of this building during the summer.

Gas Works

A contract was let to the Economical Gas Apparatus Construction Company in April 1917, for the supply and erection of a second carbureter-super-heater, washer, oil-heater, scrubber, water-cooled tubular condenser, oil pumps and accessories, complete with piping and connections, at a price of $10,263, to be used in

connection with a new generator, which was furnished by the William Hamilton Company.

Pickering Township

Requests and individual contracts for a supply of light and power have been received from the Hamlet of Greenwood. It is proposed to serve this section over a 4,000-volt line from Brooklin.

Requests have also been received from Pickering Village and an investigation of the probable requirements for this section has been made.

Picton

Following the urgent request of municipalities in Prince Edward County, estimates were prepared early in the year on the costs of a supply of power from the Central Ontario System.

Enabling and money by-laws were passed by very large majorities on August 31st. It is proposed to serve this town over a 4,400-volt, single-circuit line from Trenton. Power will be delivered to the municipality at 2,300 volts, from the Commission's sub-station within the town. The present 2,300-volt, 3-wire, 2-phase line will be rearranged for 2,300-volt, 3-phase operation. An electrically-driven, centrifugal pump will be installed in the local pumping-station under the direction of the Commission.

Estimates have been prepared and tentative designs made for a distributing station for Picton; also prices have been obtained for the necessary transformer.

Port Hope

Electric heaters were installed at the sub-station and have been very satisfactory. It was unnecessary to use any coal for heating purposes during the last winter, which allowed a substantial saving to be made. A flying panel was installed in the switchboard to fill a vacant space caused by a feeder panel being removed to another station.

A 300-kv-a. oil-insulated, self-cooled, 3-phase, 60-cycle, 44,000/2,400 and 4,160-volt transformer was installed to replace the 750-kv-a. unit moved to Oshawa last year. This increased the capacity of the Port Hope sub-station to 1,050-kv-a.

Work was commenced on changing over the high tension line entrances from roof to wall type, the roof bushings having been found unsatisfactory and a hazard to service.

Waterworks

A report has been made on the waterworks pumping system of the town, wherein it was shown that considerable saving would be made by electric pumping in place of steam pumping under normal conditions of fuel cost, and proportionately larger saving under present coal prices.

Port Perry

Several resolutions and requests have been received for estimates on the cost of a supply of power. Estimates are being prepared on power at 4,000 volts from Oshawa *via* Columbus.

Sulphide

Graphic reactive volt-ampere meters were installed to replace the power factor meters which were not accurate enough on such an important load.

Part of the switchboard was destroyed by lightning and arrangements have been made to install more up-to-date equipment and to rebuild the switchboard room to provide more adequate clearances.

Authorization has been given to proceed with the design of an extension to the Sulphide distributing station, including switching equipment to replace that recently destroyed by fire. The preliminary work is under way.

Trenton

A report was prepared for the municipal council on an ornamental street lighting system for the main business streets.

Negotiations have been carried on between the Commission and the municipal council leading toward the sale of the local waterworks of the town.

The power load in Trenton has increased very largely owing to the operations of the British Chemical Company. This plant has a demand of 4,500 h.p. and is supplied by a 6,600-volt line from the generating station at dam No. 2.

A 750-kv-a., 3-phase, 60-cycle, 6,600/4,160-volt transformer was installed at Trenton sub-station, to relieve the old 100-kv-a., self-cooled units which were loaded beyond their capacity.

An additional constant-current transformer was also installed to take care of the increase in the street lighting load, occasioned by the industrial activity of the town.

Another circuit of No. 0000 aluminum was run from Trenton sub-station back to the terminal transforming station at dam No. 2, to take care of the increased load and to insure uninterrupted service.

Work is proceeding on the design of a sub-station at Trenton for distributing power received from the Sidney Power House. This station is to replace the present one which is inadequate. One 750-kv-a., 6,600/2,400/600-volt, 3-phase, 60-cycle transformer has been ordered from the Canadian General Electric Company so as to meet the increased requirements.

Uxbridge

Several requests have been received from the town officials for estimates on the cost of a supply of power. Up to the present no suitable scheme has been devised for serving this district from Hydro lines as at present constructed.

Wellington

Acting on the urgent request of the village officials, estimates were made on the cost of a supply of power from the Central Ontario System. A valuation was also made of the local privately-owned plant, and negotiations opened whereby the municipality will take over the present distribution system and remodel it to suit modern requirements.

Enabling and money by-laws were passed by very large majorities on August 31st.

It is proposed to serve this village, together with Bloomfield, from a pole-type, step-down station at Wellington.

Estimates have been prepared and tentative designs made for a distributing station for Wellington, and prices have also been obtained for the necessary transformer.

Whitby Township

Petitions were received from a large number of farmers and hamlet residents in the township, and construction of rural lines approved by the township council after estimates were submitted by the Commission.

Lines are being constructed from Oshawa to Brooklin and Columbus, power being delivered over a 3-phase, No. 6 copper, 4,400-volt line. Twenty-two farms, as well as the hamlets of Brooklin and Columbus, will be served by this extension.

MUSKOKA SYSTEM

POWER CONSTRUCTION

South Falls Generating Station

The Commission's reports for 1915 and 1916 describe the taking over of this plant from the Municipality of Gravenhurst, and the changes and additions made in its equipment. This plant is located on the south branch of the Muskoka River, about three miles from the Town of Bracebridge, and is at present supplying energy to the Municipalities of Gravenhurst and Huntsville.

In addition to the work noted in the Commission's Report for 1916, the highway road was raised to permit using the maximum headwater level on the plant. This work was completed in November 1916.

Concrete saddles were placed under No. 1 steel penstock, loose earth and debris were removed, and the pipe was scraped and painted.

The final coat of paint was placed in the spring.

The old turbine was overhauled in December and work was practically completed in the same month. The governor supplied by the turbine manufacturer for the new machine, did not prove satisfactory under service conditions, and in February 1917, it was decided to order its removal and to have another type of governor installed. Due to the abnormal market conditions the new governor has only recently been delivered, and is not yet installed, but more efficient operation and better regulation will undoubtedly result when it is put into service.

On November 23d an order was placed with the Canadian General Electric Company for one 12-k.w., 125-volt, inter-pole compound wound, 1,800 r.p.m. exciter, complete with slide rails. This exciter will be belt-driven from the 750-kv-a., 720 r.p.m. generator. A 14-inch pulley with 6-inch face was supplied and installed on an extension of the shaft of the 750-kv-a. generator. This exciter is intended for emergency operation only.

On January 4th an order was placed with the Canadian General Electric Company for two 16-inch by 90-inch black slate panels complete with framework, small wiring, test link panels, etc., also for two 100/5 ampere, 6,600-volt current transformers. One panel is for the purpose of mounting one Westinghouse graphic recording wattmeter and one Westinghouse graphic recording power factor meter for the Gravenhurst feeder. The other panel is for mounting the Westinghouse graphic recording wattmeter and one Esterline graphic recording voltmeter, which record the station load and voltage. The current transformers were supplied to replace the present transformers on the 450-kv-a. generator in order to have them the same as those on the 750-kv-a. generator for the purpose of paralleling same on the station wattmeter. This equipment has been delivered at the station and will be installed early in November.

On July 10th the order was placed with the Canadian General Electric Company for one type "Ta-110" form "K-5" Tirrill Voltage Regulator with panel, with accessories. This regulator with panel is expected to be ready for shipment from the factory of the Canadian General Electric Company's Peterboro plant in December.

Gravenhurst

An additional power load of 250 h.p. has been secured from the National Potash Corporation. A single-phase induction regulator is being installed on the lighting feeder to improve voltage conditions.

Huntsville

A large number of meters, which had formerly been used on 133-cycle current, were rearranged at the Commission's laboratories for 60-cycle service.

A 75 kilowatt stand-by generator was purchased through the Commission in July 1917. This has been installed in the town's generating station.

Distributing Station

Although this station was placed in service during the month of August 1916, the Canadian General Electric Company did not complete the installation of equipment until January 1917.

Stephenson Township

Estimates are being prepared on the cost of supplying the Hamlets of Utterson and Port Sydney with light and power. It is proposed to install a single-phase, pole-type sub-station in Utterson, to transform the current from 22,000 to 2,200 volts, for distribution to the villages.

ST. LAWRENCE SYSTEM

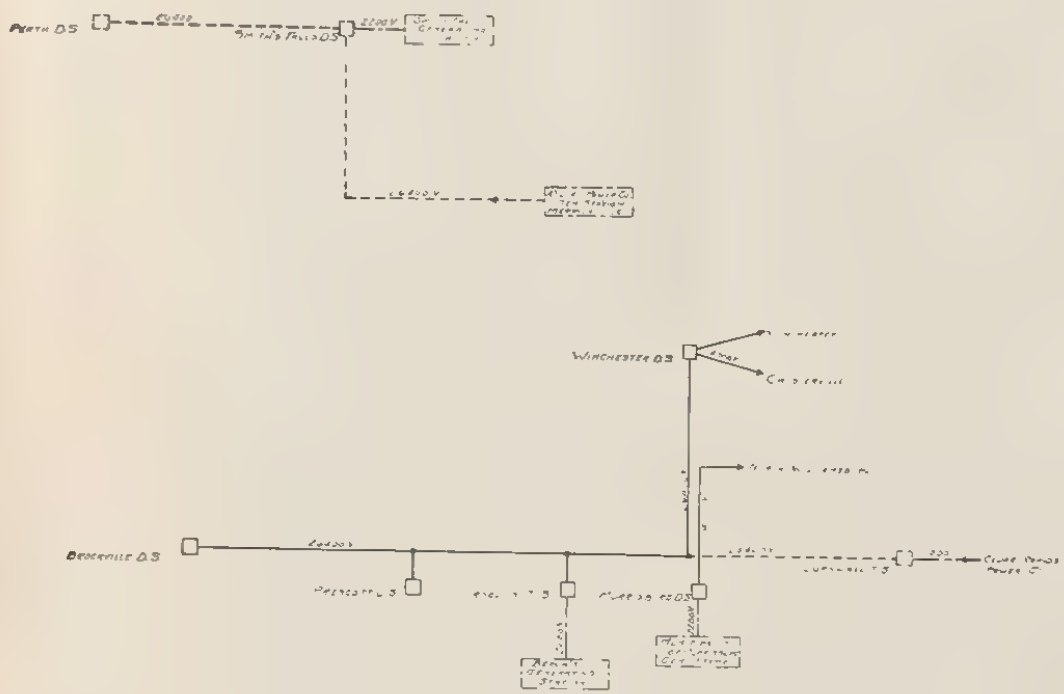
GENERAL

Numerous requests have been received by the Commission asking for investigations of the possibilities of supplying light and power by means of hydro-electric systems, and in such cases the Commission has obtained the necessary information. Estimates have been prepared showing the prices at which power could be supplied to the municipalities and these have been forwarded to the municipalities in question.

Engineering assistance has also been given to a great many of the operating towns on matters connected with rate application, economical operation of local systems, and in increasing the light and power business.

TRANSMISSION LINES

The 3/0 aluminum lines between Morrisburg and Winchester were replaced by 5/16-inch, seven-strand steel. A considerable reduction in the fixed charges on this section of the system was thus effected.



HYDRO-ELECTRIC POWER COMMISSION
OF ONTARIO

ST LAWRENCE SYSTEM
60 CYCLES

APPROVED
CHIEF ENGINEER
OCT 25 1951

-KEY-

GENERATING STATION

D STATION

STATIONS & LINES IN SERVICE

STATIONS & LINES UNDER CONSTRUCTION

C.166

STATION CONSTRUCTION

Cornwall Transformer Station

Instructions were received in August 1917 to proceed with the design and purchase of material for a transformer station, to be located at or near Cornwall. This station will receive power at 110,000 volts, 60-cycle, from the Cedar Rapids Transmission Company and transform to 26,400 volts for distribution through the eastern district. Plans are now being prepared for this station.

MUNICIPAL WORK

Brockville

Negotiations have been carried on during the year for an additional supply of power for the St. Lawrence System. It is proposed to construct, early in 1918, a transmission line between Cornwall and Morrisburg to transmit power to this system from the lines of the Cedar Rapids Transmission Company. Power will be taken at 110,000 volts and stepped down to 26,400 volts for transmission to Brockville and other towns on the system.

Chesterville

A very satisfactory increase in the power load has been brought about by the addition of the Maple Leaf Condensed Milk Company's power requirements.

OTTAWA SYSTEM

MUNICIPAL WORK

Ottawa

Estimates were prepared on the cost of heating the new Parliament Buildings by electric power.

Requests were received from the local Hydro-Electric Commission for an additional supply of 2,000 h.p. for the new Lemieux pumping station. This additional power was procured from the Ottawa and Hull Power Company, on the existing contract between the company and the Commission.

RIDEAU SYSTEM

MUNICIPAL WORK

Almonte

The reconstruction of the distribution system was completed in February 1917. The new unit has given the best of satisfaction and a considerable addition has been made to the power load.

Exhaustive investigations have been made throughout the year with a view of co-ordinating all the power sites in the town under a single efficient development.

The construction of the new street lighting system, under the supervision of the Commission, was completed. The system was placed in operation on February 13, 1917. The system includes 106 units of 150 candlepower and 26 units of 400 candle-power, all of which are of the bracket type, mounted on wood poles. The

lamps, which are nitrogen-filled, are operated on a 6.6-ampere, series circuit, which is regulated by a 25-k.w. constant current transformer.

Carleton Place

The town council on June 14, 1917, passed a resolution requesting estimates on the cost of Hydro power. Negotiations are at present under way, with a view to the purchase by the town of the present distribution system.

Kemptville

Resolutions were received in August 1917, from the Village of Kemptville, requesting an estimate on the cost of 100 h.p. Exhaustive investigations were carried out by the Commission, with a view to including this village in a comprehensive system for the eastern district.

Lanark

Resolutions requesting an estimate on the cost of a supply of light and power were received from the town officials. It is proposed to include this town in the Eastern District system mentioned in the foregoing item.

Merrickville

Arrangements have been completed providing for the purchase of a supply of power from the Rideau Power Company, at Merrickville, for transmission to Smith's Falls and the surrounding district. Power will be stepped up from 600 volts to 26,400 volts, at the Rideau Power Company's power stations, and transmitted over a single-circuit, 5/16-inch steel line. Power will be delivered to Smith's Falls early in 1918.

Rideau Power Company

At the request of this company engineering assistance in connection with the design of a transformer installation in the company's generating station at Merrickville was authorized in October 1917. Tenders were drawn up calling for three 250-kv-a., 600/26,400-volt, 60-cycle transformers. Plans are now being considered.

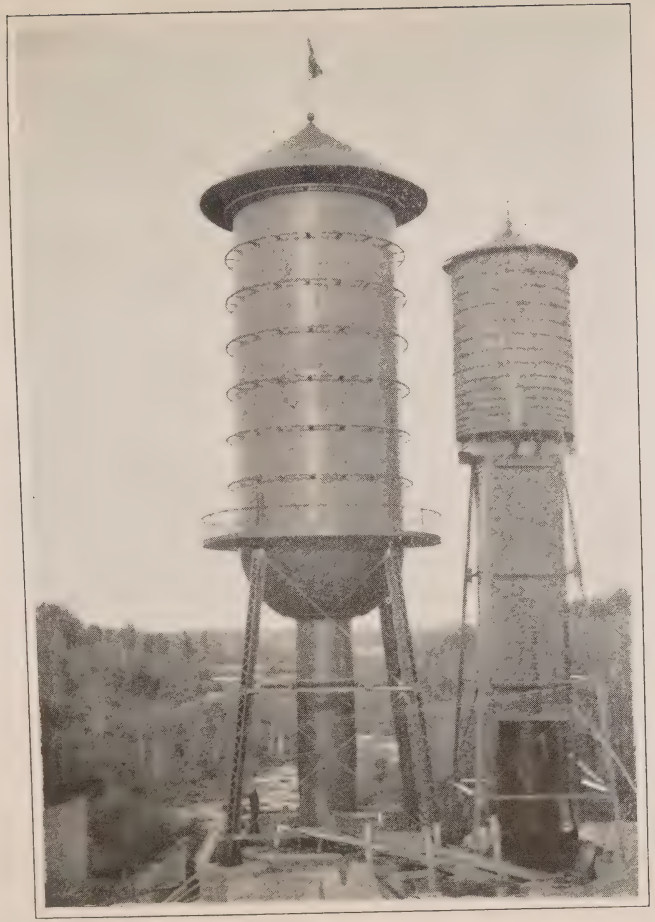
Perth

At the request of the town officials, valuations were made of the existing power-plant, distribution system and waterworks, equipment by the Commission. Negotiations were begun, which led to the purchase of these utilities by the municipality.

Enabling and money by-laws were placed before the electors on August 28, 1917, and passed by large majorities. The town will operate the utilities with the present steam and water powers until the Commission's lines are completed from Merrickville.

Distributing Station

A sub-station to distribute power for Perth is being designed, to receive power from Merrickville. One 750-kv-a., 44,000/25,300/4,160/2,400/600-volt, 60-cycle, 3-phase, O. I. W. C. transformer for this station has been purchased from the Canadian General Electric Company.



Surge Tank at Nipissing Completed with Exception of Frost-proof Lagging.

Surge Tank at Nipissing During Construction.

Smith's Falls

Exhaustive investigations have been carried on throughout the year to secure the best means of supplying Smith's Falls and adjacent towns with an adequate amount of light and power. Arrangements have been completed, by which a supply sufficient for present needs will be purchased by the Commission from the Rideau Power Company, at Merrickville and transmitted to the towns over a single-circuit, 26,400-volt line.

Valuations were made by the Commission of the two existing plants and distribution systems in the town, and negotiations completed whereby these utilities are to be taken over and operated by the municipality as a single system. Enabling and money by-laws were passed by large majorities on August 23, 1917, and construction was begun immediately. It is expected that power from Merrickville will be turned on in Smith's Falls early in 1918.

Distributing Station

Work is proceeding on the design of a sub-station at this point to distribute power received from local generating stations and from the Rideau Power Company at Merrickville. One 750-kv-a., 44,000/25,300/4,160/2,400/600-volt, 60-cycle, 3-phase, O. I. W. C. transformer has been ordered from the Canadian General Electric Company for this station.

NIPISSING SYSTEM

POWER CONSTRUCTION

Nipissing Generating Station

A new differential surge tank of steel has been installed in order to improve the speed regulation of the turbines and to reduce water surges in the pipe-line. The old tank was of wood and was in a poor state of repair. It will be removed from service in the spring. The new tank was supplied by the Canadian-Chicago Bridge and Iron Company in January 1917.

About 260 yards of concrete were placed. The new tank has a diameter of 18 feet, the gallery is 32 feet above the foundations, and the cylinder is 46.5 feet high, making an overall height of 72.5 feet.

The tank and riser are housed with a double layer of ship-lap with building-paper between, and four 10-k.w. heaters provide the necessary warmth to prevent freezing.

At the date of this report the new tank has not yet been placed in service. Preparations are being made to do so immediately.

Generator No. 3 developed trouble in the windings, and it was decided to have it removed. This work has been completed.

A modern septic-tank and sewage-disposal plant was installed at the power-house.

Preparations have been made for the installation of a storage dam in the vicinity of Cox Chutes, on the South River, as soon as the prices of materials and labor return to normal. All the necessary land has been secured.

MUNICIPAL WORK

North Bay

Plans and estimates were prepared for a new storehouse at North Bay, but it was decided to postpone the erection of this building until a later date.

A new stack was purchased and erected on the North Bay steam plant for No. 2 boiler, and another stack will be replaced as soon as it can be fabricated.

A new generator is being purchased to replace the one recently burned out, and it is expected that a number of changes will be made in the steam plant in order to increase its capacity and efficiency for stand-by service.

Considerable additional load in motors has been secured and the sale of electric ranges and appliances has been exceptionally good.

Powassan

A set of three-phase, Delta Star lightning arresters were installed at the Powassan station as a protection to the high tension transformers. A three-pole air-brake disc switch was also installed.

PORT ARTHUR SYSTEM.

MUNICIPAL WORK

Fort William

On January 1, 1917, by a vote of 700 for to 71 against, the ratepayers of Fort William expressed their approval of making a power agreement with the Commission. This by-law, however, was so drawn that it was necessary for the ratepayers to vote on the actual power agreement after it was submitted. This was accordingly done and on September 19, 1917, by a vote of 548 for to 82 against, the ratepayers approved of the new power agreement between the City of Fort William and the Commission. This agreement will take care of the city's power requirements after the expiration of the city's present power agreement with the Kaministiquia Power Company, or should the city desire to do so, it will provide power from the Commission in excess of that required to be taken from the Kaministiquia Power Company.

Port Arthur

On January 1, 1917, the ratepayers voted 712 for to 22 against, making a new power agreement with the Commission. Later in the year the new power agreement was accordingly executed with the City of Port Arthur. The old power agreement with the City expires early in 1920, and the new agreement is to provide for the continuation of a power supply through the Commission and to take care of the growth in power demand in Port Arthur and the vicinity.

SECTION V

GENERAL ACTIVITIES OF THE COMMISSION

ELECTRICAL INSPECTION

At the close of the last fiscal year the Commission's electrical inspection work had not been extended to all points in the Province, there being a few outlying districts in which it had not been found possible to secure suitable inspectors. As pointed out, the amount of work which would be involved in some of these small districts, would not warrant the expense of placing an inspector there, as only a small portion of his time would be occupied. The Commission has endeavored to locate suitable men for inspection duty in these places, and efforts have been made to secure men who are otherwise occupied, and who possess sufficient knowledge of the work to enable them to be trained in the duties of inspectors. The points referred to were the Sault Ste. Marie, Kenora, and Haileybury districts. The Commission has been able to secure suitable inspectors at these points, and their work has been commenced.

At the close of the last year the entire inspection system comprised 370 municipalities. This has now been increased to 501, so that there is practically no section in the Province without electrical inspection. By a rearrangement of the different inspection districts a continuous chain of offices has been established, thus placing every section of the Province in some inspection district. Inspection work is being handled throughout the Province with dispatch and uniformity.

During the past year there have been recorded 113,863 inspections, an increase of 13,076 over the year 1916. These figures do not include various other inspections of old installations and other separate inspections which were made by the Commission in the course of the year.

Reference was made in the last report to the overlapping of the Power Commission Act and legislation governing the Theatres, Cinematographs and Mining Departments respectively. During the past year the Rules and Regulations of the Commission and the Theatre Departments have been adjusted in a manner entirely satisfactory to both bodies, so that all confusion which may have been caused by the overlapping of these Acts has been entirely eliminated. However, legislation affecting the Department of Mines still conflicts with the Power Commission Act.

Shortly after the Commission had appointed inspectors for the Cobalt district a canvass was made of the mines in this and other districts, with the result that the majority of these mines entered into contracts with the Commission to perform a monthly inspection in their mines in accordance with the factory inspection system which was inaugurated last year. The Commission's inspectors reported that there was much dangerous and defective work in these places, but shortly after the work of inspection was begun it was necessary to abandon it, owing to the fact that these mines were already subject to inspection by the Department of Mines, and the Commission's inspection would impose what was considered to be another unnecessary inspection upon the mines.

This Annual Inspection Contract System was referred to in last year's Report. At that time it had just been inaugurated. This system has proved exceptionally satisfactory, and the Commission has at the present time 389 annual inspection

contracts, the annual fees for which amount to $12,021. It has been found in practically every instance that mine owners are willing to enter into these agreements with the Commission. The only objection has been that there were two Acts governing the same inspection.

The Commission's Rules and Regulations have been kept well abreast with current changes and practice, and have been altered and amended with new Regulations as has been found necessary. These new regulations have been carefully prepared and have been approved by Order-in-Council.

Test cases in police courts have shown that the Regulations are in order and convictions have been registered by magistrates with little hesitation in all parts of the Province where information has been laid for violations of the Rules. This has had a salutary effect, and contractors and others now make little attempt to evade the Regulations. Considering the very large number of inspections recorded there has been no cause for complaint, and any alleged grievances have been quickly and satisfactorily adjusted.

Considerable energy has been devoted to the re-inspection of old installations for the purpose of calling for the necessary overhauling of defective and dangerous work. This has been very seriously handicapped by the scarcity of labor and the abnormal rate of wages and price of material. In spite of this fact, however, the Commission has succeeded in securing an expenditure of $109,045.79 in the remodeling of these old installations during the period of five months, from June 1, 1917, to October 31, 1917. These figures are fairly accurate, as all such work is recorded on daily reports received from each inspector. On these reports are recorded all inspections and fees collected, the expenses of each office, and each week all collections of fees are balanced with the inspectors' reports and bank deposits, so that the work and records of each inspection office are under accurate supervision.

The approval of electrical fittings, materials and devices is at the present time a live issue, and an urgent appeal is being made by all bona fide manufacturers of such material for a rigid set of regulations which will compel all parties to comply with a safe and uniform standard, in the same manner which is now in force in nearly all the large American cities and most of our western cities, prominent among which is the City of Winnipeg.

The work of the year has been generally very satisfactory. At the close of last year the Commission had a staff of forty-six inspectors, which, owing to the increase of work and territory, has now been augmented by the addition of five more inspectors.

RURAL POWER

General

During the past year, owing to the growing scarcity of labor and demand for increased production, the demand for electric power on the farm has become very widespread over the different districts of Ontario, and a number of rural lines have been constructed and are under construction at the present time. Petitions asking for estimates of the cost of service have been prepared and submitted to a large number of townships as detailed in another part of this report.

New Ontario Land Clearing

Engineering assistance was also given by the Rural Department to the Department of Lands, Forests and Mines in the application of power to land clearing at Monteith and Kapuskasing in Northern Ontario in the Soldiers' settlement.

Niagara Farms

By reason of acquiring certain areas pertaining to the right-of-way of the Power Canal of the Queenston power development, and of some 607 acres of land in connection with the rights-of-way of the Ontario Power Company, the Commission has created a department which is to manage this land, or that portion of it which is suitable for agricultural purposes as a farm or a series of farms for the Commission. In this way the Commission is endeavoring to do its part in the increase of production.

Dereham Township

From the Town of Tillsonburg 33.5 miles of 4,000-volt rural line are being built, and service has been given to thirty-one farms, and the Hamlet of Brownsville in one section and is being built to fifty-eight farms, and the Hamlet of Mount Elgin in another section.

South Dorchester Township

The rural line in Dereham Township out of Tillsonburg through Brownsville was extended 3.75 miles into this township to serve the village of Springfield and six farms along the route.

Townsend Township

In this township 4.5 miles of 4,000-volt rural line have been completed and connections are being made to ten farms south of Waterford.

North and South Norwich Townships

A number of extensions to the existing rural lines in this township have been made as follows:—

1. West from Burgessville to Holbrook to serve thirteen farms.
2. From Newark to Springford and along the concession roads east and west from this line to serve thirty-two farms and the Hamlet of Springford.
3. Extension on the Quaker Road approximately 310 feet to serve Deller Bros. brick yard.
4. Extension on the Young farm to serve a municipally operated gravel plant.

5. Extension into the Otterville Branch of the Borden Condensed Milk Company's plant at Otterville, in the township.

An estimate was submitted to North Norwich Township on the cost of a rural line to serve eighteen farms by a proposed extension west on the Quaker Road.

Waterloo Township

The line from Preston to Breslau was changed from 13,000 volts to 4,000 volts, and a number of farms are being served along this road. There was also completed an extension on North King Street from Waterloo to serve twelve farms in this district. Two syndicate outfits are now in operation in this district in addition to the one on the St. Agatha Road west from Waterloo.

Petitions were received and an estimate submitted on a proposed extension north from Breslau to New Germany, and also an extension south-west from Waterloo towards New Williamsburg and south from Kitchener towards Freeport and Centreville.

Louth Township

From Port Dalhousie an extension has been completed along the Lake Shore Road west a distance of 2.6 miles, to serve twenty-seven residents and fruit farms.

Petitions have been received and estimates have been prepared on a proposed extension west from St. Catharines along the middle road of this township to serve the Hamlet of Vineland, Jordan, Vineland Testing Station and the Police Village of Jordan Station.

East Oxford Township

A petition was received and estimates prepared and submitted in connection with a proposed extension south from the City of Woodstock to Curries Corners.

Operation of Farmers Syndicates

Uses on *three groups of farms* in Waterloo Township.

A further record of the operation of Syndicate No. 1 is submitted for the year 1917 for the purpose of comparison on the same syndicate as submitted in the 1915 and 1916 reports. In addition there is also submitted a report of the two additional syndicates which were placed in operation this year.

Waterloo Township Syndicate No. 1

WORK DONE BY 20-H.P. MOTOR, JANUARY 1, 1917 to JANUARY 1, 1918

No. 1 Farm		
Silo filling	12′ x 42′	silo filled, settled and refilled twice.
Threshing	550	bushels wheat.
	700	" oats.
	1,100	" mixed grain.
	300	" barley.
Chopping	1,700	"
Sawing wood	10	cords.
Lumber	46,000	feet (used in building barn).
No. 2 Farm		
Silo filling	14′ x 39′	silo filled, settled and refilled twice.
Threshing	450	bushels wheat.
	2,400	" mixed grain.
	600	" barley.
Chopping	1,000	"
Sawing wood	16	cords.
No. 3 Farm		
Silo filling	12′ x 40′	silo filled, settled and refilled twice.
Threshing	300	bushels wheat.
	1,000	" oats.
	1,800	" mixed grain.
	350	" barley.
Chopping	2,500	"
Sawing wood	10	cords.
No. 4 Farm		
Silo filling	8′ x 22′ and 9′ x 22′	silos filled, settled and refilled twice.
Threshing	300	bushels wheat.
	1,200	" mixed grain.
Chopping	800	"
Sawing wood	20	cords.
No. 5 Farm		
Silo filling	11′ x 30′	silo filled, settled and refilled twice.
Threshing	225	bushels wheat.
	1,750	" mixed grain.
Chopping	600	"
Sawing wood	14	cords.
No. 6 Farm		
Silo filling	14′ x 40′	silo filled, settled and refilled twice.
Threshing	500	bushels wheat.
	400	" oats.
	1,200	" mixed grain.
Chopping	1,500	"
Sawing wood	10	cords.
No. 7 Farm		
Silo filling	11′ x 44′	silo filled, settled and refilled twice.
Threshing	1,000	bushels mixed grain.

Waterloo Township.—Syndicate No. 1

Uses of Power for Domestic and Power Purposes from January 1, 1917, to January 1, 1918

Rate—Service Charge (See Service Charge Column) Power 4c. per K.W.H. Discount 10% from Power only

POWER USED BY LIGHTING, SMALL MOTORS AND APPLIANCES
Kilowatt Hours

Farm No.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Cost per Year: Domestic	Power	Service Charge	Total
1	73	61	67	56	54	45	40	37	48	38	63	73	655	$23.58	$79.88	$35.00	$138.46
2	62	69	59	50	52	49	49	35	37	41	65	65	633	22.77	48.17	30.00	100.94
3	41	45	36	22	21	22	31	20	20	23	38	38	357	12.85	49.03	30.00	91.88
4	65	66	49	48	46	32	33	33	37	37	52	55	553	19.89	31.61	35.00	86.50
5	31	31	22	17	14	12	12	16	14	17	28	30	244	8.79	32.94	30.00	71.73
6	41	50	66	61	54	41	28	27	39	38	67	68	580	20.88	43.60	30.00	94.48
7	On town system														12.31	9.00	21.31
													3,022	$108.76	$297.54	$199.00	$605.30

POWER USED BY 20 H.P. SYNDICATE OUTFIT DOING WORK AS PER ACCOMPANYING TABLE
Kilowatt Hours

1				605	541					171	162	740	2,219		$79.88		
2	41	36		70				183	193	199	497	119	1,338		48.17		
3	74		72	74				93	363	64	40	582	1,362		49.03		
4	59	6	45					87	95	441		145	878		31.61		
5	36			32					229	43		575	915		32.94		
6		33		54	46				288			790	1,211		43.60		
7							6		217	119			342		12.31		
													8,265		$297.54		

EQUIPMENT ON FARMS

1. 1 H.P. 3 phase motor, washing machine, iron, toaster, vacuum cleaner
2. " " " " " "
3. " " " " " "
4. 1 H.P. 3 phase motor " " " " " "
5. " " " " " "
6. 1 H.P. 1 phase motor " " " " " "

Uses included in domestic record table.

Waterloo Township Syndicate No. 2

WORK DONE BY 20-H.P. MOTOR FROM DATE OF INSTALLATION UNTIL JANUARY 1, 1918

No. 1 Farm	
Silo filling	12′ x 40′ and 12′ x 40′ silos filled, settled and refilled.
Threshing	300 bushels wheat.
	700 " barley.
	300 " mixed grain.
	700 " oats.
Chopping	450 "
Sawing wood	5 cords.
No. 2 Farm	
Silo filling	12′ x 30′ silo filled, settled and refilled.
Threshing	100 bushels wheat.
	1,400 " oats and mixed grain.
Cutting straw	2 days.
Sawing wood	4 hours.
No. 3 Farm	
Silo filling	12′ x 42′ silo filled, settled and refilled.
Threshing	200 bushels wheat.
	600 " oats.
	300 " mixed grain.
Sawing wood	6 cords.
No. 4 Farm	
Silo filling	9′ x 10′ x 23′ and 8′ x 9′ x 23′ silos, filled, settled and refilled.
Threshing	100 bushels wheat.
	1,400 " oats.
	800 " barley.
Straw cutting	3 hours.
Sawing wood	8 cords.
No. 5 Farm	
Silo filling	9′ x 24′ and 10′ x 14′ x 20′ silos filled (in ¾ days), settled and refilled.
Threshing	200 bushels wheat.
	600 " oats.
	300 " mixed grain.
Sawing wood	6 cords.
No. 6 Farm	
Silo filling	12′ x 33′ silo filled, settled and refilled.
Threshing	100 bushels wheat.
	500 " oats.
	200 " barley.
	200 " mixed grain.
Chopping	900 "

Waterloo Township Syndicate No. 2

Uses of Power for Lighting, Small Power and Large Power Purposes from the date of Installation until January 1, 1918
Rate—Service Charge $30.00 per year ; Power 5c. per K.W.H. Discount 10% from Power only

POWER USED BY LIGHTING AND APPLIANCES
Kilowatt Hours

Farm No.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Cost per Year: Domestic	Small Power	20 H.P. Motor	Service Charge	Total
1	.....	.....	.....	.....	.....	7	10	21	24	42	48	52	204	$9.18	$2.70	$27.13	$17.50	$56.51
2	.....	.....	.....	.....	.....	11	11	24	25	43	50	59	224	10.08	.45	12.28	17.50	40.31
3	.....	.....	.....	.....	.....	8	3	5	4	32	31	39	122	5.49	8.10	15.79	17.50	46.88
4	.....	.....	.....	.....	.....	7	13	16	14	26	31	35	142	6.39	5.62	25.29	17.50	54.80
5	.....	.....	.....	.....	.....	15	15	18	20	25	29	25	147	6.61	1.35	9.04	17.50	34.50
6	.....	.....	.....	.....	.....	13	29	38	34	52	51	61	278	12.51	.....	17.46	17.50	47.47
													1,117	$50.26	$18.22	$106.99	$105.00	$280.47

POWER USED BY 5 H.P. MOTOR
Kilowatt Hours

1	.....	.....	.....	.....	.....	10	10	10	.....	20	10	.....	60	.....	$2.70	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	10	.....	.45	.....	.....	.....
3	.....	.....	.....	.....	.....	20	30	30	20	20	20	40	180	.....	8.10	.....	.....	.....
4	.....	.....	.....	.....	.....	10	15	15	5	30	20	30	125	.....	5.62	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	10	10	10	30	.....	1.35	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
													405	.....	$18.22	.....	.....	.....

POWER USED BY 20 H.P. SYNDICATE OUTFIT DOING WORK AS PER ACCOMPANYING TABLE
Kilowatt Hours

1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	140	169	294	603	.....	.....	$27.13	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	57	178	19	.....	19	273	.....	.....	12.28	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	68	13	135	69	66	351	.....	.....	15.79	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	135	17	200	.....	210	562	.....	.....	25.29	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	62	.....	104	35	.....	201	.....	.....	9.04	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	37	198	.....	52	101	388	.....	.....	17.46	.....	.....
														2,378	.....	.....	$106.99	.....	.....

EQUIPMENT ON FARMS

1.—5 H.P. 3 phase motor washing machine, iron toaster
2.—5 H.P. 3 " " " " " "
3.—5 H.P. 3 " " " "
4.—5 H.P. 3 phase motor iron toaster
5.—5 H.P. 3 " " " "
6.—2-1 H.P. 1 phase motor on lighting circuit, iron toaster.

Waterloo Township Syndicate No. 3

WORK DONE BY 20-H.P. MOTOR FROM DATE OF INSTALLATION UNTIL JANUARY 1, 1918

No. 1 Farm		
Silo filling	12′ x 30′	silo filled, settled and refilled.
Threshing	100	bushels wheat.
	1,050	" oats.
	50	" barley.
	650	" mixed grain.
No. 2 Farm		
Silo filling	12′ x 36′	silo filled, settled and refilled.
Threshing	1,300	bushels oats.
	500	" barley.
Chopping	225	"
Rolling	80	"
No. 3 Farm		
Silo filling	11′ x 25′ and 8′ x 25′	silo filled, settled and refilled.
Threshing	260	bushels wheat.
	900	" oats.
	350	" barley.
	1,200	" mixed grain.
Chopping	350	"
No. 4 Farm		
Silo filling	10′ x 16′ x 30′	silo filled, settled and refilled.
Threshing	65	bushels wheat.
	300	" oats.
	250	" barley.
	350	" mixed grain.
	60	" rye.
Chopping	250	"
Sawing wood	3	cords.
No. 5 Farm		
Silo filling	12′ x 28′	silo filled, settled and refilled.
Threshing	100	bushels wheat.
	1,000	" oats.
	600	" mixed grain.
	150	" barley.
Chopping	200	"
No. 6 Farm		
Silo filling	9′ x 24′	silo filled, settled and refilled.
Threshing	1,000	bushels oats.
	350	" barley.
	600	" mixed grain.
Chopping	300	"
Sawing wood	12	cords.

Waterloo Township—Syndicate No 3.

Uses of Power for Lighting, Small Power and Large Power Purposes from the date of the Installation of the Equipment until January 1, 1918
Rate—Service Charge $30.00 per year; Power 5c. per K.W.H. Discount 10% from Power only

POWER USED LIGHTING AND APPLIANCES — Cost per Year

Farm	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total	Domestic	Small Power	20 H.P. Motor	Service Charge	Total
1	.....	.....	.....	.....	.....	10	22	34	28	47	36	42	219	$9.85	.....	$10.66	$17.50	$38.01
2	.....	.....	.....	.....	.....	9	15	20	27	45	52	62	230	10.35	.....	13.27	17.50	41.12
3	.....	.....	.....	.....	.....	5	5	9	10	20	27	36	112	5.04	.....	17.32	17.50	39.86
4	.....	.....	.....	.....	.....	10	15	22	27	53	56	47	230	10.35	.....	14.21	17.50	42.16
5	.....	.....	.....	.....	.....	12	17	27	34	70	65	96	321	14.44	$6.16	13.41	17.50	51.51
6	.....	.....	.....	.....	.....	15	16	23	29	53	55	55	246	11.07	.....	13.81	17.50	42.38
													1,358	$61.10	$6.16	$82.78	$105.00	$255.04

POWER USED BY 5 H.P. MOTOR—K.W.H.
Kilowatt Hours

1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	20	30	7	40	30	10	137	.....	$6.16	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
													137		$6.16			

POWER USED BY 20-H.P. SYNDICATE MOTOR DOING WORK AS PER ACCOMPANYING TABLE
Kilowatt Hours

1	.....	.....	.....	.....	.....	.....	.....	.....	52	68	.....	117	237	.....	.....	$10.66	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	68	77	.....	150	295	.....	.....	13.27	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	66	56	58	.....	205	385	.....	.....	17.32	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	70	49	102	17	80	318	.....	.....	14.31	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	43	55	70	.....	130	298	.....	.....	13.41	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	71	32	67	68	69	307	.....	.....	13.81	.....	.....
													1,840			$82.78		

EQUIPMENT ON FARMS

No. 1.—1 H.P. single phase motor on lighting circuit, iron, toaster.
2— " " "
3—1 H.P. single phase motor on lighting circuit " "
No. 4—1 H.P. single phase motor on lighting circuit, iron, toaster.
5—5 H.P. three " " " " " "
6—1 H.P. single " " " " " "

ELECTRIC RAILWAY WORK

General

The work of collecting data and statistics of construction methods, operating revenues and expenses of existing electric railways was continued during the year. A number of lines were inspected and data obtained first hand from officials in charge.

The Chief Engineer, while in the west during the summer, interviewed the presidents and operating officers of some of the more progressive lines in that district, such as the Chicago, Milwaukee & St. Paul, the Spokane and Inland, the Pacific Electric, the Southern Pacific, etc. The officials met were most obliging and furnished details of their revenues and expenses that will be of considerable service to the Commission. The experiences of these companies with special equipment such as high-voltage converting machines, highway crossing-signals, pantagraph-trolleys, etc., are of special interest, as such apparatus is not in use on electric lines in the east, and it is, therefore, difficult to obtain operating experience with them. The class of service given by these western roads is much superior to that found on our existing steam or electric lines, and closely resembles the service on our proposed trunk lines, so their operating rules and methods are particularly instructive.

The Commission collected information on freight business moving into and out of the towns on the proposed lines during the years 1915 and 1916. During the past year this information was carefully sorted, classified and tabulated. It has now been assembled in proper form for use in estimating the probable freight business that can be secured by constructing any of the proposed lines. It is thought that these studies represent the most careful and thorough work of this kind that has ever been attempted in Ontario. It involved considerable expense, but it was thought most advisable to have full and reliable information on this class of business rather than to follow the usual method of practically guessing at the probable revenue.

Proposed Hamilton—Niagara District Lines

As indicated in the last annual report the ratepayers on the proposed Port Credit-St. Catharines and the Welland-Port Colborne-Bridgeburg lines voted on by-laws on January 1, 1917, to construct these lines. The estimated cost of construction and equipment was placed at $11,360,363 and $2,208,716 respectively. Considerable opposition developed in some of the municipalities, especially in Hamilton and St. Catharines. In the former city the three daily papers were against the plan.

Meetings were held throughout the district, the speakers being supplied by the Hydro-Electric Railway Association. Engineers from the staff attended, to supply details of the estimates when requested. It was found that a great deal of the opposition mentioned above was due to a lack of knowledge of the plan, many thinking that the lines were to belong to the Commission after being bonused in the old method by the municipalities. Much of the opposition, however, was from those who were interested in the existing private companies in the district. The result of the voting on the two lines are given herewith—that for the Welland line showing that not a single municipality registered an adverse majority.

PORT CREDIT, HAMILTON, ST. CATHARINES LINE

Municipality	Vote		Majority	
	For	Against	For	Against
Toronto Township	237	125	112	
Trafalgar "	138	43	95	
Flamboro, E "	144	117	27	
Barton "	416	374	42	
Grimsby, N "	194	140	54	
Clinton "	219	29	190	
Louth "	275	7	268	
Granfham "	382	95	287	
Grimsby Village	159	59	100	
Beamsville "	165	23	142	
Oakville. Town	268	37	231	
Burlington "	250	123	127	
St. Catharines, City	1,049	375	674	
Nelson Township	90	101	.....	11
Saltfleet "	104	241	.....	137
Hamilton, City	3,192	3,626	.....	434
Total Vote	7,282	5,515	1,767	.....

WELLAND, PORT COLBORNE, BRIDGEBURG LINE

Municipality	Vote		Majority	
	For	Against	For	Against
Crowland Township	191	80	111	
Humberstone "	328	91	237	
Bertie "	538	114	424	
Humberstone, Village	146	4	142	
Port Colborne "	216	3	213	
Fort Erie "	78	8	70	
Welland, Town	452	85	367	
Bridgeburg, Town,	148	7	141	
Total Vote	2,097	392	1,705	.....

The municipalities on various proposed lines in the Niagara District were very much interested in the two lines that were being voted upon and it was decided to indicate just what further lines could be expected to be constructed in the district. A meeting was called at Hamilton in March and general figures of cost, revenue and expenses given to delegates from the municipalities on the following lines:

1. St. Catharines—Niagara Falls.
2. Hamilton—Port Dover.
3. Hamilton—Galt—Kitchener.

The delegates were very optimistic over the outlook for the construction of these lines at the close of the war, but it was felt that final recommendations and estimates should be left in abeyance until that time. The situation in Hamilton, where an adverse vote on the Port Credit-St. Catharines line was given, should also be cleared up first.

St. Catharines Street Railway

The local street railway is now operated by a private company under a franchise that is renewable every five years unless the property is purchased by the city. One of the five-year terms expires this year, and a deputation consisting of the mayor, some aldermen and city officials called at the office to secure information which would assist them in deciding whether or not the franchise should be renewed. The matter was carefully looked into subsequently by the city officials, and the Commission had some rough estimates prepared showing the probable cost of the property, the annual revenue and expenses if operated by the city. With this data before them, the Mayor and officials decided it would not be advisable to take over the line at this time.

London and Port Stanley Railway

The Commission assisted the officials of this line at various times during the year, both in connection with new rolling stock, highway crossing signals, and other matters. Four new trail cars and two new motor cars were purchased and equipped to assist in handling the enormous passenger service that is offered the line in the summer months. The two new motor cars that were designed by the Commission are probably the finest equipment to be found on any electric line in America. They are of steel construction throughout, and are provided with main, smoking and baggage compartments. The seats and interior furnishings are the best that can be secured, and are very much commented upon by travellers using the line. These cars are 75 feet in length, and were placed in service during July of this year.

Whitby

The Military Hospitals Commission has erected a large hosptial near the Asylum grounds, about one and one-half miles south of the centre of the Town of Whitby. There is no means of transportation from the hospital to the town or even as far as the Grand Trunk Railway station. It was, therefore, suggested that the Commission should construct that portion of the Toronto-Markham-Whitby Railway, that would provide transportation over the above route. It will be remembered that eleven municipalities voted favourably on by-laws in October, 1914, to provide for the construction of a line from the lake, at Whitby, northward through the town to Port Perry. This line, along with others from Stouffville and Brooklin, would connect with the City of Toronto.

The matter was taken up by the local Board of Trade and the project endorsed by the various manufacturers, the Asylum and military authorities. The Council requested the Commission to prepare a report on the suggested plan.

Engineers visited the municipalities and found that it would be perfectly feasible to construct a suitable line on the main street. This line would connect with the hospital and Asylum grounds, both the Grand Trunk Railway and Canadian Pacific Railway main stations, the three manufacturing plants, as well as running through the centre of the business and residential districts. The various establishments receiving and forwarding freight were called upon, and appeared anxious to assist the project any way that could be suggested to them. They supplied data as to freight moved and charges for same as handled at present.

The information obtained is now being used to prepare the report requested.

Baysville District

Acting on the resolutions received from municipal councils in this district, the Commission secured engineering and traffic data with which to prepare a report on the feasibility of constructing a line from the Grand Trunk Railway at Gravenhurst, Bracebridge or Huntsville to the Lake of Bays district.

The data obtained indicated that the most favourable location would be from Gravenhurst to Baysville, and in August 1916, a report was sent to the municipalities recommending the construction of a 28.8-mile line. The gross cost of construction and equipment was placed at $1,461,765, and the estimated annual revenue and expenses at $198,625 and $74,916 respectively. Interest of $63,875 increased the annual charges to a total of $138,791. The report stated that the figures of timber traffic, as furnished by various lumber companies, were not checked by the Commission's staff, and that this would have to be done before actual construction could be recommended by the Commission.

A meeting of delegates of the municipalities was held on November 22, 1916, at Gravenhurst, and the lumber companies stated that the proposed rates were too high for them to consider. The rates were about 50 per cent. higher than standard mileage rates on trunk lines. It was also found that there had been a misunderstanding in figuring on some of the timber that was available. The lumber companies presented a proposed schedule of rates that would be satisfactory to them and a revised estimate was made and sent to the municipalities in February 1917. This estimate covered the same line, but the revenue was reduced to $113,750, and the annual charges, including interest, were placed at $148,004. The municipalities were very much disappointed at the conclusions, and found upon investigating the matter that the lumber companies had suggested rates that were much lower than those charged on steam trunk lines. They then requested a third estimate, which was sent to them in March. This estimate was based on lumber rates equivalent to those charged on steam roads. These figures placed the total annual revenue and charges at $133,840 and $127,828 respectively. This third report is now under consideration by the municipalities and lumber companies.

Proposed Ottawa—Morrisburg Line

The data secured from this district in 1916 by the Commission was used to prepare a report on a line from Morrisburg, through Chesterville to Ottawa. The Commission authorized a report to the municipalities, but further information on revenue was promised by some residents of the district, and it was thought advisable not to forward the report, until this information had been received and studied.

Ontario West Shore Railway

This line, extending from Goderich to Kincardine, was promoted some years ago and the municipalities induced to bonus the line for $400,000. A right of way was purchased, some grading and track-laying done, but finally the property was abandoned, and the municipalities are now paying some $20,000 a year interest on debentures, but have no prospect of ever receiving service over the line. Acting on requests from the municipalities, the Commission examined the line and prepared an estimate of the cost of completing the work and also on the probable operating revenue and expenses of the line if opened for traffic.

Alternative figures were furnished on electric and gasoline cars and the information sent to the municipalities in December 1914. The report was not a favorable one, and it was thought best to endeavor to dispose of the property this year while prices for second-hand railway equipment were unusually high. Before doing so, however, the municipalities asked for a more detailed investigation into the cost of completing the line and placing it in service. A survey was made and exact estimates prepared, which indicated that $642,000 additional money would have to be put into the property to complete it, and that the annual revenue and charges would be $58,434 and $107,070 respectively.

A report with the above figures was sent to the municipalities under date of March 28, 1917. Delegates from the municipalities met to consider the report and decided to advertise the tracks and property for sale to the highest bidder. The greater part of the equipment was subsequently sold to the Commission for use on the Niagara Development Railway.

Peterborough Street Railway

Although there are few if any cities as small as Peterborough that are supplied with as good a street railway system as that furnished by the Commission, still there is a demand for additional tracks in sections of the city that have now no service. The Commission is now engaged in preparing a report on the feasibility of constructing additions to the existing tracks. The presence of so many level street crossings of the steam lines along with the river make it a difficult matter to improve the existing layout.

Proposed Minden District Railway

A deputation from this district called at the office and requested the Commission to prepare a report on the feasibility of constructing and operating a line into Minden Village from Coboconk or Kinmount. The Commission has secured traffic information by calling on the various shippers, and has made a survey of a line from Kinmount Junction to Minden, a distance of about ten miles. A report is now being prepared for submission to the municipalities.

MUNICIPAL WORK

Cobden

The local hydro-electric plant installed during 1916 has given entire satisfaction. Considerable increases in lighting and power loads have been effected.

Street Lighting

In this municipality was installed the first outdoor pole-type of constant-current transformer, with stationary coils, that has been placed in service in Ontario. This transformer has a capacity of 7.5-k.w., with 2,300-volt primary, and 6.6-ampere secondary circuit. There are 31 lamps of 150 candle-power and 13 lamps of 400 candle-power, all being gas-filled, incandescent series lamps. The system was designed and installed under the supervision of the Commission, and was placed in service on November 25, 1917.

Gore Bay

In response to a request an engineer visited Gore Bay during the summer of 1917 and collected data in connection with a proposed distribution system for the town. There being no power demand, lighting will be the chief use for electrical energy.

Haliburton

The Municipality of Dysart has applied to the Commission for engineering assistance in designing and constructing a local hydro-electric plant and distribution system. Estimates are being prepared with a view to going forward with this construction during the coming year.

Minden

Municipal surveys were made for light and power in this district, in connection with investigations for an electric railway line from Kinmount Junction.

Monteith

At the request of the Provincial Department of Lands, Forests and Mines, the Hydro-Electric Power Commission made a reconnaissance survey in May 1917, of the power site on the Driftwood River at Monteith, Ontario, with the object of ascertaining whether a supply of power could be developed for the Monteith Soldiers' Training Farm and the Municipality of Monteith.

A wooden dam had already been built at this site for lumbering purposes by the Monteith Pulp and Timber Company, and it was found that a head of fourteen feet would be available for power development. The flow of water was estimated to be sufficient to develop about 75 h.p.

For this small development it was decided to purchase the second-hand turbine and generator offered for sale by the Municipality of Paris, Ontario, and to construct a short timber flume and wheelpit with suitable buildings for housing the machinery. Work was commenced on October 19th and at the date of this report is nearing completion. It is expected that power will be available early in the year 1918.

The Commission during the past year gave assistance to the Ontario Department of Agriculture in the installation of a generating station on the Driftwood River capable of developing 75 h.p., and the construction of a distribution system to supply the Soldiers' settlement and the Sailors' and Soldiers' School at Monteith.

Parry Sound

Detailed investigations were made on the power possibilities of the Seguin River. A report and sketch of proposed alterations and extensions to the present power plant were forwarded to the town officials. Actual construction of the plant and conservation system has been deferred on account of the high cost of materials and labor.

Sudbury

Considerable work has been done in connection with a proposed supply of power to the British-American Nickel Company, and it is anticipated that the power agreement will be executed early in the coming year.

Thessalon

In response to a request an engineer visited Thessalon and investigated the power possibilities of the district, including Blind River and Bruce Mines. An ample supply of power in the vicinity is capable of development, but a market sufficient to warrant hydro-electric development has not yet been secured.

There are prospects of pulp mills locating in this district and this would make power at reasonable rates available to the municipalities adjacent thereto.

GENERAL ENGINEERING

Municipal Waterworks

In addition to the activities of the Commission in connection with waterworks as described elsewhere under the headings of the various municipalities concerned, information has been supplied to a number of cities, towns and villages regarding their pumping and water supply requirements. Among these are Exeter, Preston, Listowel, Galt, St. Thomas, Goderich, Paris, Stratford and Woodstock. In most instances these estimates concerned pumping requirements, for either domestic or fire supply; in some, attention was given to sewage pumping, while for the last named city, a valuation of the waterworks plant was made at the request of the municipality.

In a number of cases pumping equipment and water supply for small institutions and farm buildings have received attention. Among these are the farm buildings of Mr. R. J. Graham, Belleville, and the McLaughlin Estate, Whitby.

Fixation of Nitrogen

The fact that this subject was under investigation was referred to in the 1916 Annual Report and some general notes on the subject were given indicating the great importance now attached to it throughout the civilized world for the manufacture both of artificial fertilizers and of explosives.

Records have been kept during the year of the progress of the industry and various new developments have been noted. This department has now on file a considerable mass of information relating to this subject.

Utilization of Peat

Data have been collected from various sources relating to the utilization of peat as fuel both for heating and for the generation of power, and a preliminary report has been prepared, from existing records, on the feasibility of erecting in

Canada plants for making producer gas from peat, using it for the generation of electric power, and recovering by-products.

Preservation of Timber

In connection specially with the preservation of poles and cross arms this subject has been under review for some time; a good deal of information has been assembled and the merits of the various methods in use in different places have been noted. Recently a specification covering the preservative to be used and the methods of application which may be employed has been prepared for the use of the Commission.

Inspection and Testing

During the year the following work has been done:—

1. Insulators.

The following units have been inspected and delivered for construction and replacement purposes:—

90,000	— 110,000 V.	Susp.	Type.
3,700	— 44,000 V.	Pin	"
16,000	— 26,000 V.	"	"
20,000	— 13,000 V.	"	"
107,800	— 4,000 V.	"	" and Telephone.
5,500	— strain		"
2,000	— Misc.		"
Total..245,000			

2. Cable.

(*a*) Alum. steel reinforced, refabricated.

1,000 lbs.	—	No. 2 S.R.A.C.
75,000 "	—	145,000 c.m. S.R.A.C.
569,572 "	—	6/0 S.R.A.C.
60,000 "	—	not yet refabricated.

Of the above 69,158 lbs. of the aluminum content were bought and 387,165 lbs. taken down from existing lines.

(*b*) Copper.

40,000 lbs.	—	500,000 c.m.
30,000 "	—	4/0 stranded.
75,000 "	—	2/0 "
227,000 "	—	1/0 "
50,000 "	—	Misc.

(*c*) Steel wire.

58,000 lbs.	—No.	14 BWG.
400,000 "	—No.	13 NBS.
1,055,000 "	—No.	12 "
407,000 "	—No.	9 " (both hard and soft).
355,000 "	—No.	6 "

Of the above, 230,000 lbs. of No. 12 has been used for aluminum steel reinforced cable core. The balance, along with the No. 12 and No. 13, is being stranded into guy, ground and conductor cable.

375,000 lbs. of No. 9 has been fabricated into guy and conductor cable. The balance is largely in stock.

TESTING AND RESEARCH LABORATORIES

Mention was made in the preceding Annual Report of the proposed additions to the laboratory space and equipment. These changes are now being accomplished. The space in the original building previously occupied by the stores, machine shop and garage was vacated about September 1st, and the installation of the necessary partitions, electric circuits, equipment, etc., was immediately begun. It is expected that this work will be completed in about four months. Reference will be made below to the principal features of the new installation and the proposed additions to equipment.

In addition to the general work of the laboratories which is described below, reference will here be made to work of a special and research nature. The problem of relay protection has received considerable attention and progress is being made along several lines of investigation which show promise of satisfactory results.

The question of the suitability of iron and steel for electric line conductors is being extensively investigated. These investigations include principally tests on an experimental line erected near the laboratories and will include all commercial sizes and grades of iron and steel wire.

In addition to these laboratory tests, a test was made on a 22,000-volt line, 25 miles long, for which iron wire had been used. The line was short circuited at the load end, the metering equipment was set up in the power house and the 4,000-volt generators connected directly to the line in order to obtain the low voltage necessary to force current through the line. This test furnished a check on the laboratory measurements and gave sufficient data to calculate directly the regulation of the system concerned.

Other subjects of investigation include the study of special cases of trouble arising in connection with the installation or operation of equipment on the system, some of which have necessitated the re-design of, or modification of existing apparatus.

The Commission is co-operating with the University of Toronto in connection with the industrial research programme which has been inaugurated by that institution. A member of the laboratory's staff was appointed to a research fellowship in October. He is making investigations which have a direct bearing on a problem now being studied by the Commission, and is working in co-operation with the laboratories and operating staff.

The increase in the volume and variety of general testing work has been very great during the year and especially during the past six months. It has probably been most marked in connection with the approval of electrical devices and the transfer of used apparatus for the municipalities.

A full description of the activities of the various departments of the laboratories follows:—

High Tension and General Testing Laboratory

The work of the High Tension and General Testing Laboratory as mentioned in previous reports, has covered a great variety of tests during the year, of which approximately one-half may be described as routine tests for various departments of the Commission or for municipalities served by the Commission. Of the remainder about one-half were approval tests of a great variety of electrical devices and fittings submitted by manufacturers who wished to sell these goods in the Province of Ontario, and the rest are special tests or investigations carried on at the instance of various departments of the Commission.

During the year the volume of work in all lines as just outlined has increased greatly, especially in the matter of approval inspection and testing. It is expected that this will still further increase in the coming year as more manufacturers avail themselves of the use of the laboratories.

To carry on the work, a special devices and fittings testing room is being equipped, in which all such low-voltage appliances may be both electrically, and where necessary, mechanically tested. Since the last report there have passed through the laboratory many types of equipment inclusive of such as cartridge and plug-fuses, knife and oil switches, motor-starters, service-boxes, sockets, rosettes and a great number of heating appliances, consisting of air-heaters, grates, electric logs, grills, toasters, water heaters, etc.

These have all been tested with the view of eliminating to the greatest degree the danger of fire hazard from their use in the homes and offices of the ultimate consumer and also of rendering each device as far as practicable safe to handle by the public.

As mentioned in previous reports the high tension testing laboratory has been of great value to the Commission in the so-called routine tests, that is tests which are a matter of routine work only and require no special investigation to obtain results. Under this head may be included the monthly testing of oil samples from all the high tension transformers and oil switches on the Niagara System, the testing of special samples from new distributing stations or from municipal or industrial consumers of power, of which approximately fifty were made since last report was written.

A considerable portion of time is spent on the examining and testing of used distributing transformers and motors which, as has been noted before, are handled by the Commission as agent for various municipalities. This work has also been considerably augmented recently and upwards of seventy transformers and motors have been handled by the laboratory in the year. Other transformers and instrument transformers have been given high potential or resistance to ground tests, notably one of the 5,000-kv-a., 110,000-volt transformers at Toronto Terminal Station in the latter part of the year. Air-break disconnecting switches manufactured in the Commission's machine shop are also given flashover test before being shipped out for installation on 13,200, 26,000 or 44,000-volt transmission lines. Megger and flashover tests have been applied to various types and sizes of line and station insulators for the purpose of checking field observations or attempting to solve problems met with by the operating department.

The standard specifications for rubber gloves have been adopted in the past year and now all gloves for use on lines or stations of the system or for municipalities when purchased through the Commission are submitted to the laboratories for acceptance test.

It is proposed in the coming year to institute a monthly re-test of all rubber gloves used by the various departments, and to facilitate this a complete record system for keeping the history of each glove has been adopted.

Special investigations and tests have been conducted for a variety of purposes a few of which may be mentioned. An investigation of the conditions tending to produce electrolysis in the cable duct lines feeding the Niagara Transformer Station. The investigation of the failures of choke-coils in some of the low tension stations, efficiency tests of motors and pumps for municipalities, insulation and physical tests on insulating tapes and varnishes, measurements of water resistivity and dielectric strength of various insulating materials were among some of the problems attacked during the year. Some work was also done on the design of some equipment for testing and for charging the high tension transmissiion lines. Under this heading may also be included the work done by the laboratories on the investigation of the properties of iron and steel wire for transmission purposes and the investigation of the whole matter of relay protection for the Niagara Distributing System. These latter investigations, however, were conducted by special members of the staff outside the personnel of the high tension laboratory.

To the high tension testing equipment that has been in use in the laboratory for some three years now has been added a complete range of spheres in three sizes: three inch, six inch and ten inch. These are mounted in wooden frames according to the standards of the American Institute of Electrical Engineers and provided with control of the gap adjustment. The high tension voltage measurements obtainable with these spheres have a high degree of accuracy. It is proposed and plans have already been drawn to provide a complete low tension testing equipment by which all motors, transformers, heaters and other electrical devices operating on voltages up to 2,200 volts may be completely tested. This equipment will consist of three test panels, each with its necessary oil switch relay and instrument transformers. The first panel will be a three-phase, 2,300-volt, 40-ampere panel, and will be capable of testing three or two-phase, 25-cycle, 2,300-volt motors up to 175 h.p., or 60-cycle, 2,300-volt motors up to 65 h.p., which is the present capacity of the laboratory 60-cycle generator. By this panel also transformers up to 90-kv-a. at 2,300-volts may be tested. Panel number two will be a three-phase, 550-volt, 200-ampere panel and will be capable of testing three or two-phase, 25-cycle, 550-volt motors to 200 h.p., or 60-cycle, 550-volt motors to 65 h.p. It will also be able to test 25-cycle transformers up to 100-kv-a., or in other words any appliance requiring less than 200 amperes and at less than 600 volts. A third panel is being provided for use in all direct current equipment tests up to a rating of 200 amperes, 250 volts. Besides the three stationary test panels mentioned above, a portable panel for use any place in the laboratory is being installed at once which will be capable of testing any single-phase appliance requiring not more than 60 amperes at 250 volts.

In the laboratory extension plans room has been provided for practically trebling the floor space previously occupied by the high tension laboratory. The rooms on the ground floor formerly occupied by the meter and photometric departments will now be used for test rooms and office space by this department. In the basement a work shop and storage room and a receiving floor have been set aside for this department in space previously occupied by the machine shop. With this increased space and equipment, the work of this laboratory will be greatly facilitated.

Meter and Standards Laboratory

The activities of the Meter and Standards laboratory have embraced a wide variety and a considerable volume of both research and routine work. Solutions have been found for many of the problems which continually arise in electrical measurement. New types of apparatus have made their appearance and have been examined as to their adaptability to the purpose for which they are intended. And, in the meantime, efforts have been made to fulfil the requirements of the every day routines of metering.

With the new laboratory standard instruments it has become possible to make checks on the accuracy of portable apparatus with reasonable speed and precision, so that periodic tests may now be made on the various portable meters employed in the laboratory work. Equipment belonging to other departments also is calibrated, and instruments are sent in by the municipalities for checks on accuracy as well as for repairs. In the new extension of the laboratory there has been provided a special room where the standard instruments, permanently set up, away from all disturbing influences may at any time be used without fear of interference with other work.

In the course of the year a number of new meters, particularly for the measurement of demand, have been placed on the market and upon these some extensive tests have been made. In this connection there has also been run a detailed investigation into the theory of demand measurement with particular reference to the comparative value of the arithmetical average and what is known as the logarithmic average as basis for the computation of demand. The former quantity is what has been aimed at in most meters of the electro-mechanical type; but owing to the fact that, unfortunately, there has not yet appeared any instrument to measure it with absolute definiteness, there has been a tendency to discount the arithmetical average in favour of the logarithmic. The latter quantity has the merit that the logarithmic law governs the heating of apparatus; and, as meters whose indications follow this law can be produced it is possible to obtain a check on the limiting factors of the load. On the other hand there has been raised to this method of metering, the objection that an intelligent comprehension of the true significance of the values obtained, demands a knowledge of some rather intricate mathematical relationships; whereas the meaning of arithmetical average is very easily understood.

Considerable oscillographic work has been done during the year. This includes a detailed investigation into the operating characteristics of electrolytic lightning arresters on systems where no transformers are interposed between the line wires and the generator winding.

Oscillographic records have also been obtained of electrical quantities concerned with pieces of apparatus undergoing repair and alterations. Among these may be mentioned telephones, meggers and automobile magnetos.

A large number of measurements on the resistance of various kinds of wire for telephone lines have been made, and samples of metal submitted for bus and cable clamps have been tested for conductivity. To facilitate this work a Kelvin double bridge is being procured.

The watt-hour meter department has handled a large volume and great variety of work in the year. Much study and research has been devoted to the development of a system of meter inspection. It is felt that present methods are not keeping pace with the rapid strides in the art of metering, and there are many points where improvements over the system now in use may well be made. This is

particularly true of curve-drawing and demand meters. A full report on this matter has been prepared and submitted to the meter committee of the Commission.

The system of rebuilding old meters has found favour among the owners and users of that class of apparatus, and the demand for second-hand instruments continually exceeds the supply. During the year almost 1,500 meters of various makes, types and sizes have been passed through in this way, and large shipments are in sight for the coming year. As there are now in stock in the Commission's storehouse large numbers of new meters, there has become necessary a certain amount of supervision of the quality of the goods. These meters were bought on the results of acceptance tests made by the laboratory. Occasional visits are made by members of the staff to the factory where they are built, and it is thus possible to keep a certain check on the workmanship and material entering into their construction. Occasional complaints from customers, about unsatisfactory operation of meters, have been investigated, the responsibility properly assigned, and the trouble rectified where necessary. The facilities of the Laboratory are at the disposal of the Dominion Government inspectors for the testing and sealing of meters for use in the Toronto inspection district. Besides a large percentage of the repaired meters, above referred to, there have passed through the laboratory for inspection, in the year, over five hundred new meters.

In addition to the classes of work dealt with in the foregoing paragraphs, and a large number of minor tasks such as the repairing of meggers, indicating and graphic meters, relays and time switches, there has been done under the direction of this department a great volume of the engineering work connected with the new laboratory extensions. This has included the location of testing rooms and storage space, the layout of power, lighting and testing circuits, and the design of test benches and tables for a variety of special requirements.

Lamp Laboratory

The condition of the incandescent lamp market during the past year has been very unsettled, due to the enormous demand on American lamp factories and the difficulty of securing shipments of European lamps. Japanese lamps have appeared on the Canadian market and several of other makes heretofore unknown generally are being found. The efforts of the purchasing department of the Commission and some lamp distributing companies to keep posted on the quality of the lamps appearing on the market have resulted in an increased use of the lamp laboratory. The test racks have been used to full capacity, and in order to handle the increase of work temporary circuits were added. The routine testing of stock lamps has been carried on as usual. Particular efforts are being made to prevent the shipment of all gas-filled lamps that are liable to give unsatisfactory service. Our methods of detecting defects are such that complaints are very few. A portable testing table is under consideration that will facilitate the testing of all gas-filled lamps so that the Commission will be reasonably sure that every lamp is in satisfactory condition before shipment.

On account of the rapid development of series lamps since the installation of our life test equipment our present equipment has become entirely inadequate, and it became necessary, both to enlarge the racks and to provide a more suitable means of supplying current to them. For the latter purpose a constant-current transformer has been ordered. With the original equipment only a very limited number of different sizes and current ratings could be placed on the racks at one time. The controls for the constant-current transformer are arranged so that the entire

capacity may be taken up by lamps of one current rating regardless of size or the individual currents may be separated or grouped and supplied with different current value as may be required. This arrangement provides great flexibility and it is expected to fulfil any requirement for series lamp testing that may arise.

The lamp laboratory has been hampered for some time by insufficient space in which to carry on the work. New quarters on the top floor have been allotted, which provide more room and easy access to the lamp stock which is on the same floor. In the re-installation of the test apparatus in the new location provision is made for future extensions without in any way interfering with the present equipment.

New electrical metering equipment has been acquired by the department that enables much greater accuracy to be attained.

A change has been made in the rating of the Commission's series lamps. The old rating was in terms of candle power. The new lamps are rated according to their watts consumption. This has been done because candle power as applied to the gas-filled series lamps has no real significance and is not a measure of the light output of the lamps. Under the watts rating the number of lamps that may be supplied by one transformer is determined without any reference to lamp efficiency. This plan is working out satisfactorily. The two ratings are here compared:—

Old Candlepower Rating.	Equivalent Watts Rating.
100	80
150	100
500	250
750	500
1,000	750

Tests of series amps., made according to the new specifications, indicate that the 4,000-hour lamps will give satisfactory service.

Illumination Laboratory

The illumination laboratory has, as in former years, made tests of illuminating devices and materials as required by various departments of the Commission as well as by some outside parties.

The ordinary distribution tests of reflectors and globes have formed the bulk of the work. Tests were made of the total transmission of light of some samples of different types of window glass. Considerable difference was found among different kinds and the results indicate that this feature is worthy of consideration in the planning of day lighting of buildings. A thorough investigation of automobile head lamp glasses was made to determine the characteristics of the beams of light from them. The principal features under test were the distribution of light in the beam and the road illumination resulting from such. The results of the former, when plotted as curves, showed the direction of maximum intensity angular spread and the relative amounts of glare resulting from the different types of glasses. For this purpose a standard automobile head lamp was set up so that different angular positions from the horizontal axis could be made in vertical and horizontal planes. The measurements were made with an illumination photometer at a distance of 30 feet. Measurements of road illumination were made at 10-foot intervals from 10 feet to 100 feet from the headlight. The types of glasses tested included prismatic and diffusing. It was found that the two types are very widely different in their characteristics.

An Automobile Headlight set up for Test

A View of the Photometer Room, Lamp Laboratory. An 84-inch Spherical Photometer is Shown at the Right.

Structural Materials Laboratory

Though but a little over a year old this department is already one of the largest in the laboratories. Its work has grown both in volume and in diversity and now includes the chemical as well as the purely physical testing of the materials used in engineering. It has, therefore, been necessary to devote additional space, install a more complete and varied equipment, and add to the staff to take care of these increased demands.

The department now occupies approximately 2,500 square feet of floor space, of which 750 square feet is devoted to housing the testing machines and other large apparatus, 350 square feet is set apart for a cement and sand laboratory, the same amount for a chemical laboratory, 800 square feet is used as a concrete laboratory and the rest as a moist room and for miscellaneous storage. The whole is amply supplied with cupboards, tables, benches and other miscellaneous equipment, so arranged as to facilitate the work being carried out.

As was noted in the last annual report, complete equipment for the testing of concrete and its constituent materials was then on order or contemplated and most of this is now installed. Some of the principal items included are: An Olsen hydraulic compression machine of 200,000 pounds capacity, a complete set of both sand and stone sieves, having a combined range of from 0.0029 inches up to 3.00 inches, a Howard and Morse power-driven mechanical sieve shaker of a capacity to handle both the sand and stone sieves just noted, and a score or more of each of 2-inch, 6-inch and 8-inch cylindrical moulds for casting mortar and concrete test pieces.

Further additions have been made to our cement testing equipment giving us a capacity of ten complete tests per day. To do this has required a large number of additional moulds, increased storage facilities, another cement-testing machine and a quantity of miscellaneous equipment of various kinds.

A start has been made toward equipping a chemical laboratory. A very fine analytical balance has been purchased and there is now on order the necessary equipment and chemicals to enable qualitative and quantitative tests to be made on metals, cements and other inorganic compounds. Besides this, we are now installing equipment for the testing of gasolines and motor fuels, and have under consideration the purchase of that necessary for the testing of transformer and lubricating oils.

Although there have been many other additions to the equipment of this department only one more will be mentioned, a 2-inch Berry strain gauge for determinations on the elastic properties of metals. This instrument is of the latest and most accurate type, so arranged as to give readings which are the average of two determinations on opposite sides of the specimen. It is capable of the very finest work and can be used to detect a change in length in the bar under test of as little as .00002 inches.

By far the greater part of the work of this department comprises tests and investigations on concrete and its constituent materials. During the year just past fourteen sand and gravel pits have been investigated. Such an investigation comprises a field examination of the pit and extensive laboratory tests upon representative samples of the deposit. In addition to this some sixty samples of sand and gravel have been received and tested. Further, all cement used in any of the Commission's work is regularly tested, and this work alone runs into a large number of tests in a season's time.

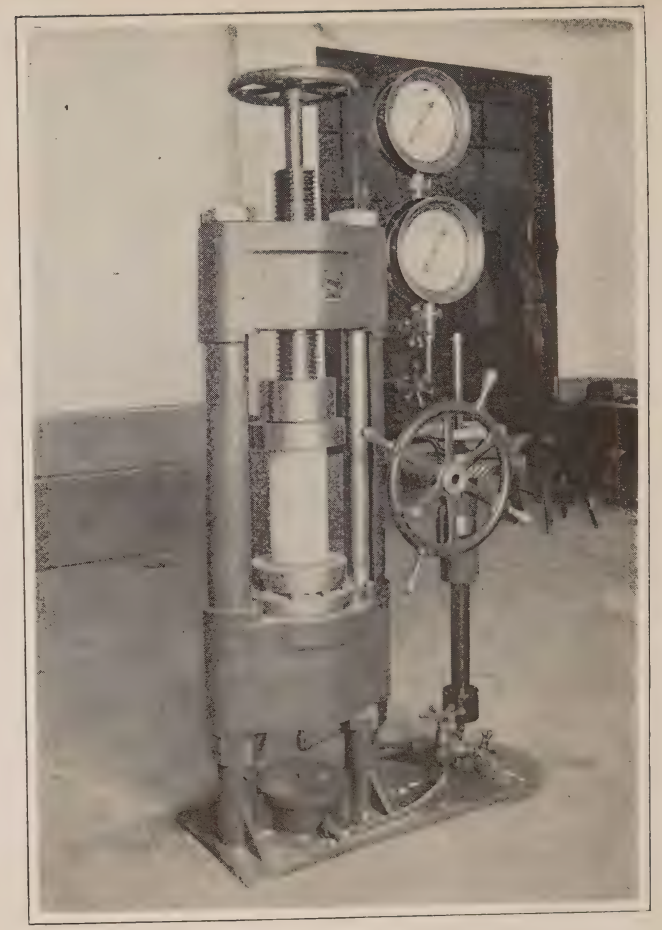
This is not the only work, however, being done on concrete and its constituent materials. A very extensive study is now under way in connection with the Niagara Power Development. Materials from the sources to be used on this work are being proportioned in various ways to determine the most economical mix which will give the desired strength and watertightness; also, what changes in these proportions will be necessary to take care of the inevitable changes in the character of the natural materials. In this same connection studies are being carried out with a view to classifying concrete not by the ratio of its different constituent materials, but by the minimum compressive strengths obtained at set ages. This will involve preliminary tests on the materials prior and during construction, and check tests on the concrete as made on the job. Besides this, much work, preliminary to these studies, has been necessary to standardize test procedure and apparatus before much of the above could be begun. This work has now been nearly completed.

As was noted at the beginning, this department's activities have broadened and work is being done in lines other than the testing of cement, concrete and the various metals. Previously some attempts had been made to test paint but with indifferent success. During the year this work has been placed on a more rational basis: system has been put into the method of handling paint inquiries; a card index has been kept covering all available information on the paints submitted to us for test; exposure tests have been standardized and steps are now under way to make it possible to check up by chemical means purchases of these paints with the samples previously submitted for our examination.

The testing of gasoline has been instituted. The Commission is a large consumer of gasoline, and in view of this and the present unsatisfactory state of the gasoline industry, it has been deemed desirable to place some check upon the quality of our purchases. Initial studies of methods for carrying out this work have been made and the necessary special apparatus ordered. It is expected that this will be in place and that this work will be actively under way early in the coming year.

Besides those mentioned many other kinds of tests were carried out during the year. These include chemical analyses on various materials, mechanical tests on insulators, physical tests on transformer oils, galvanizing tests on wire and line hardware, tension tests on steel and other metals and miscellaneous studies on the necessary equipment for certain proposed new lines of work. This miscellaneous work is rapidly on the increase and will continue to increase as the fact that the laboratory has facilities at hand to carry it out successfully, is more fully realized.

An Agitator with a Nest of Sieves in Place. It is used by the Structural Materials Laboratory to Save Labor in Making Tests of Sand and Gravel.



A 200,000-pound Compression Testing Machine in the Structural Materials Laboratory. A Concrete Specimen is Shown Under Test.

GENERAL CONSTRUCTION

General

The work on station construction during the past fiscal year has been carried on under increasing difficulties in securing material and labor. Deliveries have become slower and manufacturers' promises in many cases have not been met, owing to the raw material situation consequent upon war conditions. In order to keep a check on the manufacturing conditions, inspectors were sent by the Commission at frequent intervals to the factories of the contractors, and every effort was used to hasten deliveries. Prices on all material and apparatus have increased considerably over the prices in effect the previous year.

Administration Building

Owing to the necessity for increased accommodation for the staff at the Administration Building, it became necessary to fit out for offices a dwelling at 55 Murray street, which is situated at the rear of the Administration Building. This was done and the building was occupied as an office in August.

As this increased accommodation was not found to be sufficient, the dwelling at 59 Murray street was purchased by the Commission. This, also, is being altered for office use and will be occupied early in November.

The dining-room for the staff and the electric kitchen in the basement of the Administration Building were completed and placed in service in March.

Service Building

The work on the extension to Toronto Storehouse on Strachan avenue, referred to in the last Report, was carried on throughout the winter by Messrs. Witchall and Sons, the contractors, and the building was completed early in the summer. Following this, the work necessary for remodelling the original building for the Laboratory extension was completed.

The name of this building was changed from the Toronto Storehouse to the Service Building. A Bell telephone private branch exchange was installed in August, which, in conjunction with the extension of the automatic telephone system in this building, affords ample telephone service.

The Service Building, including the extension, is now 132 feet long by 112 feet 5½ inches wide, and is 49 feet 4 inches high from the basement floor to the top of the parapet.

The extension provides for a garage at grade level, 66 feet wide and 112 feet 6 inches long, a machine-shop of same dimensions immediately over the garage. The addition will also give increased storage space. Two elevators were installed, one with platform 20 feet 6 inches long by 8 feet wide, to run from the garage floor to the third floor level. The other elevator is in the storage section. This has a platform 10 feet by 7 feet and runs from the basement floor to the third floor level. Shipping and receiving platforms were erected at the sides of the building for convenience in handling shipments. The construction of a railway siding to this building is under consideration.

British Forgings, Limited (Imperial Ministry of Munitions)

At the request of the Imperial Ministry of Munitions, the services of the Commission were used in the design, purchase and installation of the electrical equipment and distribution system required for the electric steel furnace plant of British Forgings, Limited, Ashbridges Bay, Toronto. Owing to restrictions by the Imperial Ministry of Munitions, no details of the equipment installed may be published.

Instructions to handle this work with all possible speed were first received on January 8, 1917. Plans were immediately prepared and materials purchased as speedily as possible. Frequent visits were made by the Commission's inspectors to the plants of the electrical manufacturers. Many parts were made in the Commission's own machine shop, in order to get quick delivery.

The actual installation work of the electrical equipment was started on April 25, 1917. All work was finally completed by the end of October.

The Service Building, Strachan Avenue, Toronto.

Table No. 1

CAPACITIES OF TRANSFORMERS INSTALLED OR ORDERED FOR COMMISSION'S STATIONS*

Total Capacity. 506,640 Kv-a.

Station	Voltage	Transformers Installed		Transformers on Order		Total Station Capacity Kv-a.	System Capacity Kv-a.
		Mfr.	Kv-a.	Mfr.	Kv-a.		
NIAGARA SYSTEM.	25-Cycles						
1. Niagara Transformer Station	12,000—110,000	C.W.Co.	99,500	C.W.Co.	67,500	.....	
	12,000— 45,700	C.G.E.Co.	35,000	.....	.....	202,000	
Niagara Falls Distributing Station	12,000— 4,000	C.W.Co.	300†	.....	.....	300	
2. Dundas Transformer Station	110,000— 13,200	C.G.E.Co.	7,500†	.....	.....	7,500	
Caledonia Dist. Station	13,200— 2,300	P.T.Co.	450	.....	.....	450	
Waterdown " "	13,200— 2,300	C.C.W.Co.	225	.....	.....	225	
Hagersville " "	13,200— 4,000	C.W.Co.	225	.....	.....	225	
Lynden " "	13,200— 4,000	C.W.Co.	225	.....	.....	225	
3. Toronto Transformer Station	110,000— 13,200	C.G.E.Co.	20,000	C.G.E.Co.	55,000	.....	
	110,000— 13,200	C.G.E.Co.	32,500†	.....	.....	107,500	
4. London Transformer Station	110,000— 13,200	C.G.E.Co.	8,750	.....	.....	8,750	
Dorchester Dist. Station	13,200— 4,000	C.W.Co.	225	.....	.....	225	
Lucan " "	13,200— 4,000	C.G.E.Co.	225	.....	.....	225	
Delaware " "	13,200— 4,000	P.E.Co.	75	.....	.....	75	
Exeter " "	13,200— 4,000	C.G.E.Co.	300	.....	.....	300	
5. Guelph Transformer Station	110,000— 13,200	C.W.Co.	3,000	.....	.....	3,000	
Acton Dist. Station	13,200— 2,300	C.W.Co.	225	.....	.....	225	
Georgetown Dist. Station	13,200— 4,000	C.G.E.Co.	450	.....	.....	450	
Rockwood " "	13,200— 2,300	C.G.E.Co.	75	.....	.....	75	
Cheltenham " "	13,200— 575	C.G.E.Co.	225	.....	.....	225	
Fergus " "	13,200— 2,300	C.G.E.Co.	225	.....	.....	225	
Elora " "	13,200— 4,000	C.W.Co.	225	.....	.....	225	
6. Preston Transformer Station	110,000— 6,600	C.G.E.Co.	3,000	.....	.....	.....	
	110,000— 6,600	C.G.E.Co.	2,250†	.....	.....	.....	
	13,200— 575	P.E.Co.	225†	.....	.....	5,475	
South Waterloo Tp. Dist. Station	6,600— 4,000	C.G.E.Co,	60	.....	.....	60	
7. Kitchener Transformer Station	110,000— 13,200	C.G.E.Co.	6,000	.....	.....	.....	
	110,000— 13,200	C.G.E.Co.	750†	.....	.....	6,750	
New Hamburg Dist. Station	13,200— 2,200	P.E.Co.	225	.....	.....	225	
Baden " "	13,200— 4,000	C.C.W.Co.	450†	.....	.....	450	
Elmira " "	13,200— 4,000	C.W.Co.	225	.....	.....	225	
St. Jacobs " "	13,200— 575	M.E.Co.	75	.....	.....	75	

* Spare transformers are included. † Transformers to be transferred to other stations.

Table No. 1—Continued

CAPACITIES OF TRANSFORMERS INSTALLED OR ORDERED FOR COMMISSION'S STATIONS*—Continued

Total Capacity, 506,640 Kv-a.

Station	Voltage	Transformers Installed		Transformers on Order		Total Station Capacity Kv-a.	System Capacity Kv-a.
		Mfr.	Kv-a.	Mfr.	Kv-a.		
8. Stratford Transformer Station	110,000— 26,400	C.W.Co.	5,000				
	26,400— 575	C.G.E.Co.	150			5,150	
Listowel Dist. Station	26,400— 4,000	C.W.Co.	300			300	
Harriston " "	26,400— 4,000	C.G.E.Co.	225			225	
Tavistock " "	26,400— 4,000	C.C.W.Co.	225			225	
Milverton " "	26,400— 4,000	C.G.E.Co.	225			225	
Palmerston " "	26,400— 4,000	C.G.E.Co.	225			225	
Dublin " "	26,400— 4,000	M.E.Co.	50			50	
9. St. Mary's Transformer Station	110,000 13,200	C.G.E.Co.	3,000			3,000	
St. Mary's Cement Dist. Station	13,200— 575	C.G.E.Co.	1,500				
	13,200— 575	P.E.Co.	450†			1,950	
10. Woodstock Transformer Station	110,000— 13,200	C.G.E.Co.	3,000			3,000	
Beachville Dist. Station	13,200— 2,300	C.G.E.Co.	225†			225	
Norwich " "	13,200— 2,300	S.Co. of C.	150			150	
Embro " "	13,200— 4,000	P.E.Co.	50			50	
11. St. Thomas Transformer Station	110,000— 13,200	C.G.E.Co.	4,500				
	13,200— 920	C.W.Co.	1,110				
	13,200— 920	C.W.Co.	555†			6,165	
Port Stanley Dist. Station	13,200— 2,300	S.Co. of C.	150			150	
Dutton Dist. Station	13,200— 4,000	C.W.Co.	225			225	
West Lorne Dist. Station	13,200— 4,000	C.W.Co.	225			225	
12. Cooksville Transformer Station	110,000— 13,200	C.G.E.Co.	5,000				
	13,200— 2,300	S.Co. of C.	150†			5,150	
Mimico Dist. Station	13,200— 4,000	C.C.W.Co.	450			450	
Port Credit Dist. Station	13,200— 2,300	C.G.E.Co.	225			225	
Cooksville " "	13,200— 2,300	P.E.Co.	40			40	
Streetsville " "	13,200— 4,000	C.G.E.Co.	225			225	
Woodbridge " "	13,200— 4,000	C.G.E.Co.	225			225	
Etobicoke, Temp'n "	13,200— 2,300	M.E.Co.	1,500	M.E.Co.	750	2,250	
Etobicoke Perm't "	13,200— 2,300			C.C.W.Co.	3,000	3,000	
13. Brant Transformer Station	110,000— 26,400	C.W.Co.	5,000			5,000	
Waterford Dist. Station	26,400— 4,000	C.W.Co.	225			225	
Drumbo " "	26,400— 4,000	C.G.E.Co.	225			225	

Ayr " "	26,400— 4,000	C.G.E.Co.	225			225		
St. George " "	220— 4,000	C.C.W.Co.	150			150		
Burford " "	26,400— 4,000	C.W.Co.	225			225		
14. Kent Transformer Station	110,000— 26,400	C.W.Co.	5,000			5,000		
Wallaceburg Dist. Station	26,400— 4,000	C.G.E.Co.	450	P.E.Co.	450	900		
Tilbury " "	26,400— 4,000	C.G.E.Co.	300			300		
Dresden " "	26,400— 4,000	C.W.Co.	225			225		
Bothwell " "	26,400— 4,000	C.W.Co.	225			225		
Thamesville " "	26,400— 4,000	C.W.Co.	225			225		
Ridgetown " "	26,400— 4,000	C.W.Co.	225			225		
Blenheim " "	26,400— 4,000	C.W.Co.	225			225		
Forest Dist. Station	26,400— 4,000	C.C.W.Co.	225			225		
Oil Springs Dist. Station	26,400— 4,000			M.E.Co.	75	75		
Watford " "	26,400— 4,000	M.E.Co.	50			50		
Brigden " "	26,400— 4,000			M.E.Co.	50	50		
15. Essex Transformer Station	110,000— 26,400	C.W.Co.	10,000			10,000		
Canadian Salt Co. Dist. Station	26,400— 176			M.E.Co.	2,250	2,250		404,815
Queenston Development.								
(Construction Stations)								
Montrose Sub-Station	12,000— 4,000			C.G.E.Co.	3,000			
	4,000— 575			M.E.Co.	600			
	12,000— 440			C.G.E.Co.	1,100	4,700		
Whirlpool Sub-Station	12,000— 4,000			C.G.E.Co.	4,500			
	4,000— 575			M.E.Co.	1,200			
	12,000— 440			C.G.E.Co.	2,210	7,910		12,610
Eugenia System.	60-Cycles							
Eugenia Generating Station	4,000— 22,000	C.W.Co.	2,700	C.W.Co.	2,700	5,400		
Owen Sound Dist. Station	22,000— 2,300	C.W.Co.	1,650			1,650		
Chatsworth " "	22,000— 4,000	C.G.E.Co.	75			75		
Chesley " "	22,000— 4,000	C.G.E.Co.	300			300		
Durham " "	22,000— 4,000	C.G.E.Co.	150			150		
Durham Cement " "	22,000— 2,300			C.G.E.Co.	750†	750		
Mount Forest " "	22,000— 4,000							
Hanover " "	22,000— 4,000	C.W.Co.	375†			375		
Shelburne " "	22,000— 4,000	M.E.Co.	150			150		
Grand Valley " "	22,000— 4,000	C.G.E.Co.	225†			225		
Orangeville " "	22,000— 4,000	M.E.Co.	450†			450		
Kilsyth " "	22,000— 4,000			M.E.Co.	75	75		
Elmwood " "	22,000— 4,000			M.E.Co.	50	50		9,650
Severn System.	60-Cycles							
Big Chute Generating Station	2,300— 22,000	C.W.Co.	3,600			3,600		
Penetanguishene Dist. Station	22,000— 2,200	C.C.W.Co.	600			600		

* Spare transformers are included. † Transformers to be transferred to other stations.

Table No. 1—Continued

CAPACITIES OF TRANSFORMERS INSTALLED OR ORDERED FOR COMMISSION'S STATIONS*—Continued

Total Capacity, 506,640 Kv-a.

Station	Voltage	Transformers Installed		Transformers on Order		Total Station Capacity Kv-a.	System Capacity Kv-a.
		Mfr.	Kv-a.	Mfr.	Kv-a.		
Barrie Distributing Station	22,000— 2,300	C.G.E.Co.	700			700	
Collingwood " "	22,000— 2,300	M.E.Co.	75			75	
Coldwater " "	22,000— 2,300	C.G.E.Co.	1,200			1,200	
Elmvale " "	22,000— 2,300	C.W.Co.	225			225	
Stayner " "	22,000— 4,000	C.W.Co.	300			300	
Port McNicoll " "	22,000— 2,300	C.G.E.Co.	50			50	
C.P.R. Pt. McNicoll "	22,000— 575	C,G,E,Co.	1,500			1,500	
Waubaushene " "	22,000— 2,300	C,G,E,Co.	50			50	
Midland " "	22,000— 2,300	M.E.Co.	900			900	
Alliston " "	22,000— 4,000			C.W.Co.	120†	120	
							9,320
WASDELL'S FALLS SYSTEM.	60-Cycles						
Wasdell's Falls Gen. Station	2,300— 22,000	C.W.Co.	1,050			1,050	
Beaverton Dist. Station	22,000— 4,000	C.W.Co.	300			300	
Cannington " "	22,000— 4,000	C.W.Co.	300			300	
							1,650
ST. LAWRENCE SYSTEM.	60-Cycles						
Prescott Dist. Station	26,400— 2,300	C.G.E.Co.	450			450	
Winchester " "	26,400— 2,300	C.G.E.Co.	150			150	
Brockville " "	26,400— 2,300	C.G.E.Co.	600			600	
							1,200
PORT ARTHUR SYSTEM.	60-Cycles						
Port Arthur Dist. Station	22,000— 2,000	S.Co. of C.	5,250			5,250	
							5,250
MUSKOKA SYSTEM.							
South Falls Generating Station	6,600— 22,000	C.G.E.Co.	1,200			1,200	
Huntsville Dist. Station	22,000— 2,300	C.G.E.Co.	900			900	
							2,100
CENTRAL ONTARIO SYSTEM.							
Generating Stations:	60-Cycles						
Fenelon Falls	600— 11,000	C.G.E.Co.	810			810	
Auburn	6,600— 44,000	C,G,E,Co.	3,750				
	2,400— 6,600	C.G.E.Co.	600			4,350	

Healy Falls	6,600— 44,000	C.W.Co.	10,250			10,250	
Stephens Dam	2,400— 44,000	C.W.Co.	5,625			5,625	
Sidney No. 2	6,600— 44,000	C.W.Co.	9,000			9,000	30,035
Sub-Stations:							
Northumberland Pulp Mill	44,000— 2,400	C.W.Co.	2,250			2,250	
Delora	44,000— 600	C.W.Co.	750			750	
Madoc	44,000— 4,160	C.C.W.Co.	480				
		C.G.E.Co.	300			780	
Sulphide	44,000— 4,160	C.C.W.Co.	480				
		C.G.E.Co.	750			1,230	
Stirling	44,000— 2,400	C.G.E.	100			100	
Lehigh Cement	44,000— 600	C.G.E.	3,000			3,000	
Point Anne Quarries	44,000— 600	C.G.E.	600			600	
Belleville Portland Cement	44,000— 600	C.G.E.	3,000			3,000	
Belleville	44,000— 2,400	C.G.E.	2,250			2,250	
Brighton	44,000— 2,400	C.G.E.	300			300	
Colborne	44,000— 2,400	C.G.E.	100			100	
Newcastle	44,000— 2,400	C.G.E.	100			100	
Bowmanville	44,000— 2,400	C.G.E.	1,500			1,500	
Oshawa	44,000— 4,160	C.G.E.	2,250			2,250	
Cobourg	44,000— 2,400	C.G.E.	600			600	
Port Hope	44,000— 2,400	C.G.E.	1,050			1,050	
Napanee	44,000— 2,400	C.G.E.	600			600	
Deseronto	44,000— 2,400	C.G.E.Co.	600			600	
Kingston	44,000— 2,400	C.G.E.Co.	1,500	C.G.E.Co.	750	2,250	
Millbrook	44,000— 2,400	C.G.E.Co.	100			100	
Trenton	6,600— 4,160	C.G.E.Co.	750	C.G.E.	750		
	6,600— 2,400	C.G.E.Co.	600			2,100	
Lindsay	44,000— 2,400	C.G.E.	1,500				
	11,000— 2,400	C.G.E.	750			2,250	
Peterboro	6,600— 2,400	C.G.E.	2,250			2,250	30,010
						Grand Total	506,640

* Spare transformers are included.

† Transformers to be transferred to other stations.

Table No. 2

STATION TRANSFORMERS ORDERED FOR MUNICIPALITIES AND COMMISSION DURING FISCAL YEAR ENDING OCTOBER 31st, 1916

Station	Cycles	Voltage	Mfr.	No.	Kv-a. each	Total Kv-a.
Niagara Falls Trans. Station.....	25	12,000-63,500	C.W.Co.	9	7,500	67,500
Dunnville Municipal Station....	25	26,400- 2,300	C.G.E.Co.	3	150	450
Dundas Transformer Station.....	25	63,500-13,200	C.G.E.Co.	7	2,500	17,500†
Toronto Transformer Station.....	25	63,500-13,200	C.G.E.Co.	12	5,000	60,000
Guelph Transformer Station—						
Guelph Municipal Station	25	13,200- 2,300	C.G.E.Co.	2	225	.....
	25	13,200- 2,300	C.G.E.Co.	1	550	1,000
Kitchener Transformer Station ..	25	63,500-13,200	C.G.E.Co.	1	750	750†
St. Jacobs Dist. Station	25	13,200- 2,300	M.E.Co.	1	75	75
Baden District Station.....	25	13,200- 2,300	C.C.W.Co.	3	150	450†
Stratford Transformer Station—						
Dublin Dist. Station.....	25	26,400- 4,000	M.E.Co.	1	50	50
St. Marys Transformer Station —						
St. Marys Cement Dist. Station.	25	13,200- 575	P.E.Co.	3	150	450†
Woodstock Transformer Station—						
Beachville Dist. Station.....	25	13,200- 2,300	C.G.E.Co.	3	75	225†
Embro Dist. Station	25	13,200- 2,300	P.E.Co.	1	50	50
St. Thomas Transformer Station..	25	13,200- 920	C.W.Co.	3	185	555†
St. Thomas Municipal Station..	25	13,200- 2,300	C.G.E.Co.	1	750	750
Cooksville Transformer Station...	25	13,200- 2,200	S.Co. of C.	3	50	150†
Weston Municipal Station.....	25	13,200- 2,300	C.W.Co.	3	100	300
Etobicoke Temp. Dist. Station..	25	13,200- 2,300	M.E.Co.	3	750	2,250
Etobicoke Perm. Dist. Station..	25	26,400- 2,300	C.C.W.Co.	2	1,500	3,000
Kent Transformer Station—						
Sarnia Municipal Station.....	25	2,300- 370	C.W.Co.	3	185	555
Oil Springs Dist. Station.....	25	26,400- 4,000	M.E.Co.	1	75	75
Watford Dist. Station.....	25	26,400- 4,000	M.E.Co.	1	50	50
Brigden Dist. Station	25	26,400- 4,000	M.E.Co.	1	50	50
Wallaceburg Dist. Station.....	25	26,400- 2,300	P.E.Co.	3	150	450
Essex Transformer Station—						
Canadian Salt Co. Dist. Station.	25	26,400- 176	M.E.Co.	3	750	2,250
Queenston Development—						
Montrose Sub-Station.....	25	12,000- 4,000	C.G.E.Co.	2	1,500	.....
	25	2,300- 575	M.E.Co.	3	200	3,600
Whirlpool Sub-Station.....	25	12,000- 4,000	C.G.E.Co.	3	1,500	.....
	25	2,300- 575	M.E.Co.	6	200	5,700
Forebay Sub-Station	25	2,300- 575	M.E.Co.	3	200	600
Miscellaneous	25	13,200- 2,300	C.G.E.Co.	3	150	450†
	25	13,200- 2,300	C.C.W.Co.	3	150	450†
Big Chute Generating Station—						
Midland Dist. Station.....	60	22,000- 2,300	M.E.Co.	3	300	900
C.P.R. Pt. McNicoll Dist. Station	60	22,000- 575	C.G.E.Co.	3	500	1,500
Eugenia Falls Generating Station..	60	4,000-22,000	C.W.Co.	3	900	2,700
Alliston Dist. Sation	60	22,000- 2,200	C.W.Co.	2	40	80†
Durham Cement Dist. Station ..	60	22,000- 2,300	C.G.E.Co.	3	250	750†
Elmwood Dist. Station.....	60	22,000- 4,000	M.E.Co.	1	50	50
Hanover Dist. Station.....	60	22,000- 2,200	C.W.Co.	2	125	250†
	60	22,000- 2,200	C.W.Co.	1	125	125
Kilsyth Dist. Station	60	22,000- 4,000	M.E.Co.	1	75	75
Orangeville Dist. Station	60	22,000- 2,300	M.E.Co.	3	150	450†
Central Ontario System—						
Kingston Dist. Station	60	44,000- 2,400	C.G.E.Co.	3	750	2,250
Maintenance Stores	60	44,000- 2,400	C.G.E.Co.	1	750	.....
	60	44,000- 2,400	C.G.E.Co.	2	300	1,350
Smiths Falls Dist. Station	60	44,000- 2,400	C.G.E.Co.	1	750	750
Perth Dist. Station	60	44,000- 2,400	C.G.E.Co.	1	750	750
Omemee Dist. Station.....	60	44,000- 2,400	M.E.Co.	3	40	120
Trenton Dist. Station.....	60	6,600- 2,400	C.G.E.Co.	1	750	750

Table No. 2—Continued

STATION TRANSFORMERS ORDERED FOR MUNICIPALITIES AND COMMISSION DURING FISCAL YEAR ENDING OCTOBER 31st, 1916.

Station	Cycles	Voltage	Mfr.	No.	Kv-a. each	Total Kv-a.
Distributing Station Stock	25	26,400– 4,000	M.E.Co.	1	750	750
	60	44,000– 2,400	C.G.E.Co.	2	750	1,500
	60	22,000– 4,000	M.E.Co.	4	75	300
	60	22,000– 4,000	M.E.Co.	1	50	50
	60	22,000– 4,000	C.G.E.Co.	2	75	150
	60	22,000– 4,000	C.G.E.Co.	1	25	25
	25	26,400– 2,300	P.E.Co.	3	75	225

† Transformers transferred from other stations. Total Kv-a., 185,585

NOTE—The above table does not include the transformers purchased for British Forgings, Limited (Imperial Ministry of Munitions).

STREET LIGHTING

General

During the past year few ornamental systems have been constructed and work has been concentrated on the installation of the ordinary types of units, both in extensions of existing systems in some municipalities and in the replacement of obsolete equipment in others.

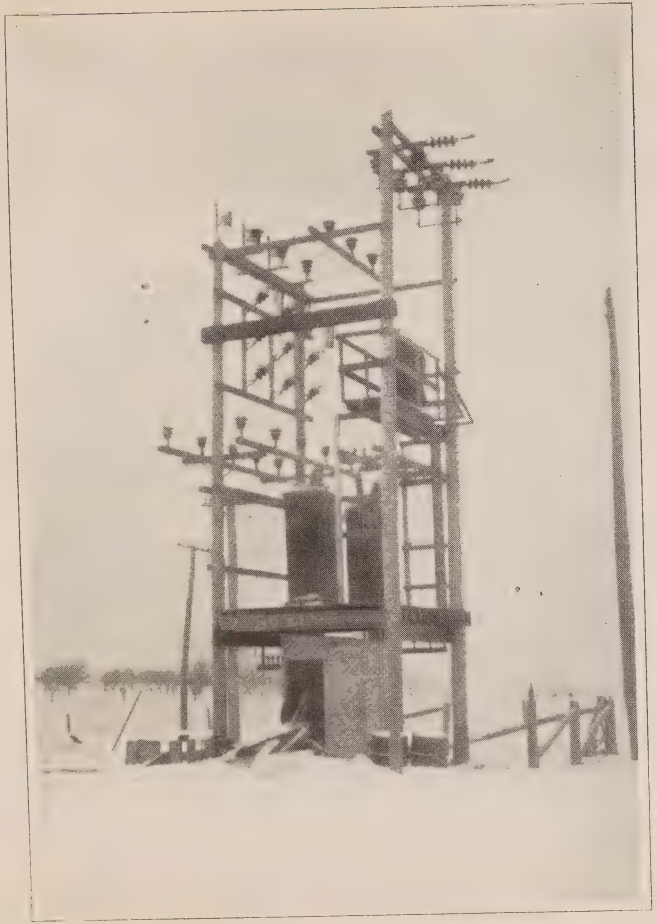
The general standard of street lighting in the Province is rapidly reaching a satisfactory condition in comparison with other districts. This is due to the extensive use of modern equipment and methods of construction, as well as to the liberal amount of illumination provided for the streets. The safety and convenience thus afforded and the improved appearance of the streets by day and by night constitutes one of the greatest benefits derived from the Hydro System. Considering the low cost at which it is supplied the return in service to the public compares favorably with that of any other form of public utility.

It is to be expected that improvement of lighting in the cities and more thickly populated districts will lead to a demand for similar service in a lesser degree along the travelled highways through the rural districts. Careful study will be required to ensure that such service may be provided at a minimum and reasonable cost. There is every reason to believe, however, that with the advance in the art the installation of these systems will become general.

Engineering advice regarding the purchase of new equipment or the operation of the street lighting systems was furnished for the following municipalities:—

Blenheim, Bloomfield, Chatham, Galt, Guelph, Gravenhurst, Kingston, Markdale, North Bay, Norwich, Peterboro, Petrolia, Perth, Pickering, Port Arthur, Renfrew, Ridgetown, Simcoe, Stratford, St. Catharines, Watford, Wellington, and Windsor.

Other street lighting advice and engineering work may be found detailed in Section IV, under the heading "Construction Work of the Commission."



Outdoor Type Distributing Station (44,000 2,400 volts) at Omemee.

A Constant Current Transformer (outdoor type) for the Series Street Lighting System at Omemee.

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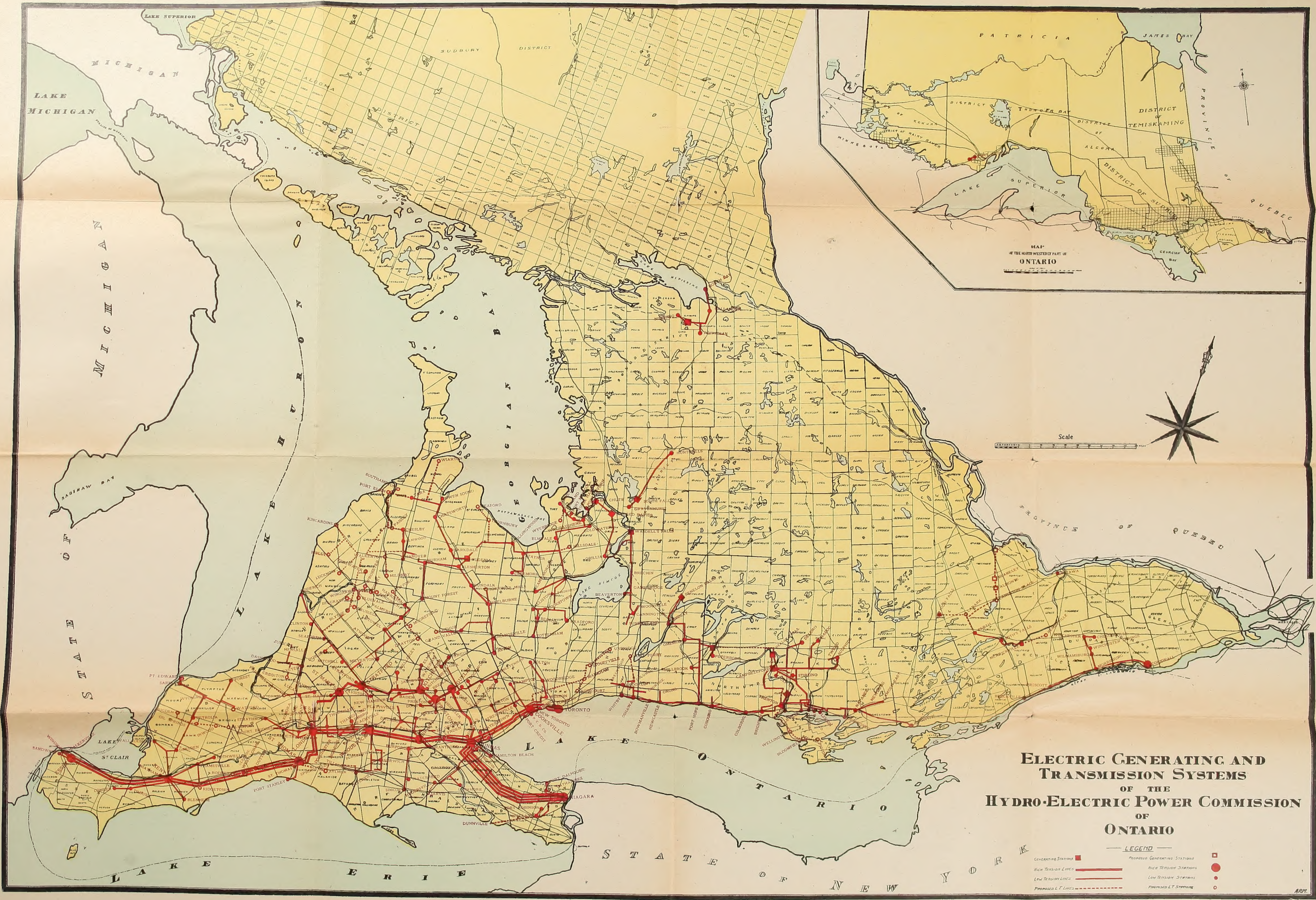
ELECTRIC GENERATING AND
TRANSMISSION SYSTEMS
OF THE
HYDRO-ELECTRIC POWER COMMISSION
OF
ONTARIO
LEGEND
MAP OF THE NORTH WESTERLY PART OF ONTARIO
Scale
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
GEORGIAN BAY
LAKE ONTARIO
LAKE ERIE
STATE OF MICHIGAN
STATE OF NEW YORK
PROVINCE OF QUEBEC
TORONTO
NIAGARA
LAKE SIMCOE
LAKE ST CLAIR
PATRICIA
JAMES BAY
DISTRICT OF TEMISKAMING
SUDBURY DISTRICT